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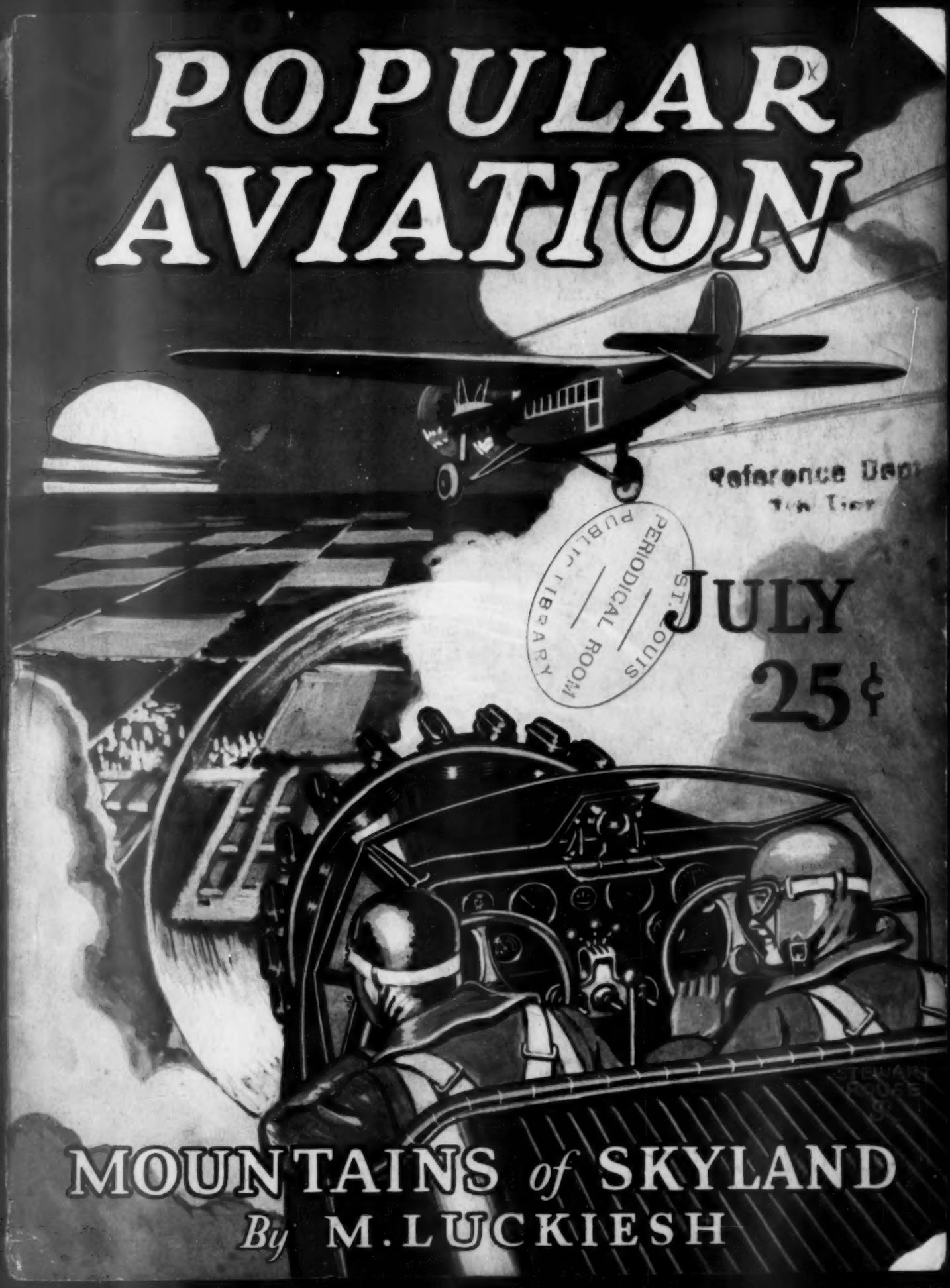

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By M. LUCKIESH

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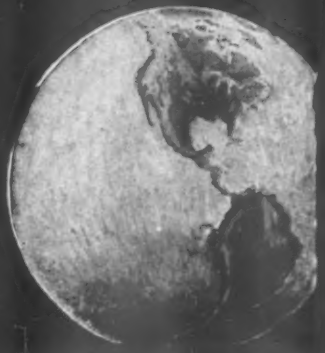

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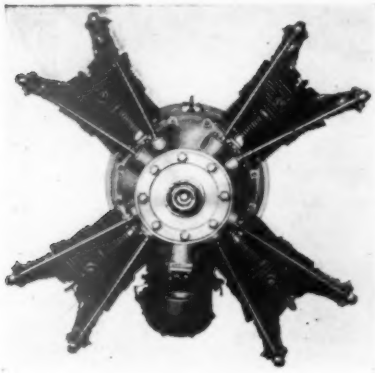

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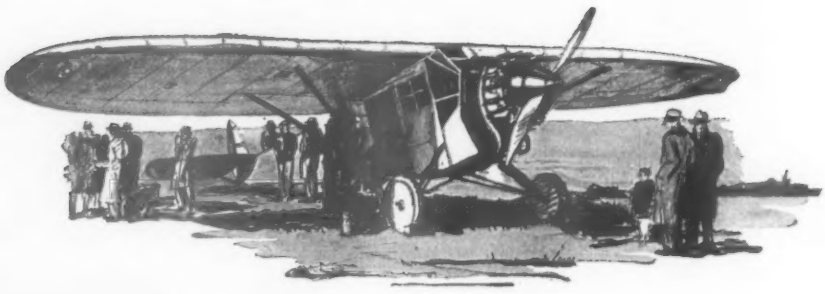

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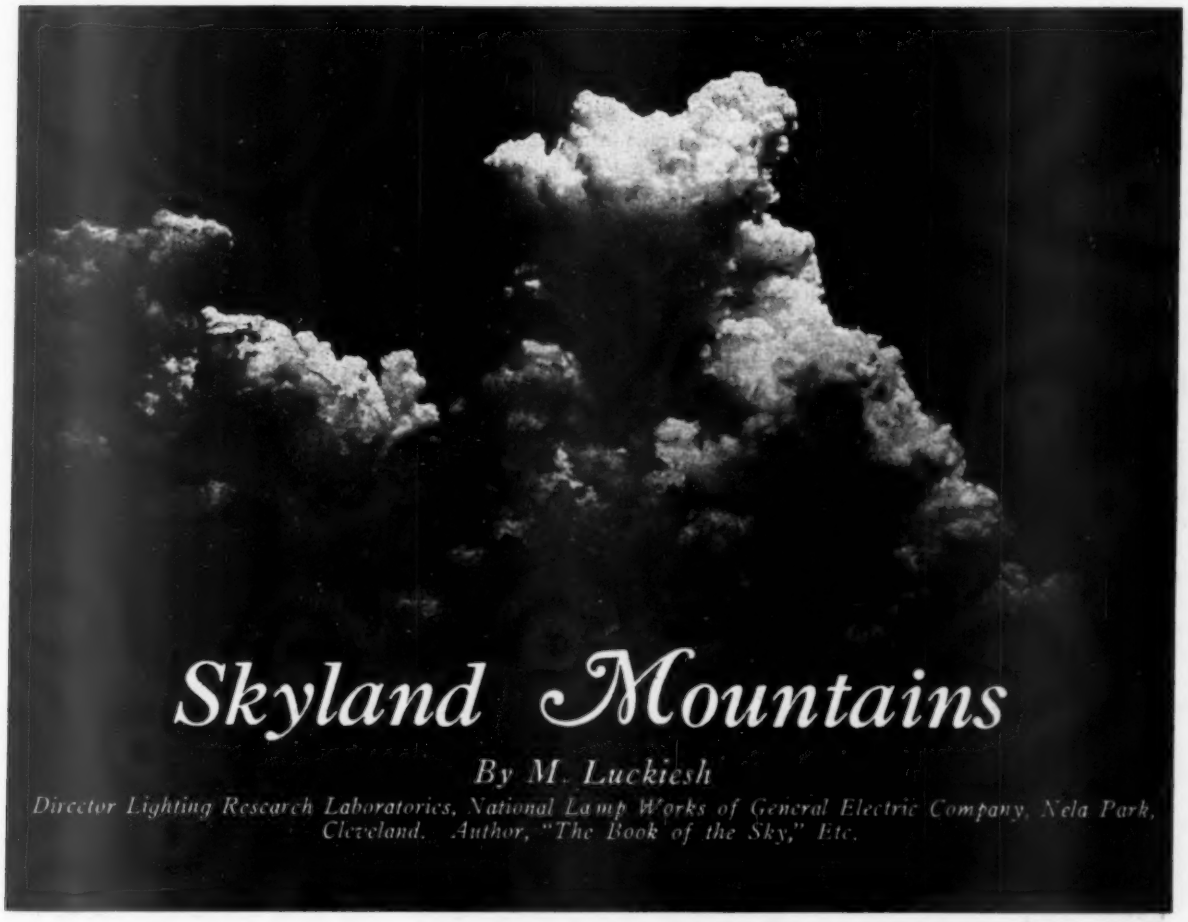


Skyland Mountains

By M. Luckiesh

Director Lighting Research Laboratories, National Lamp Works of General Electric Company, Nela Park, Cleveland. Author, "The Book of the Sky," Etc.

This mountain of skyland, four miles high, with its crest a region of perpetual cold, grew very rapidly.

FLYING has not only brought a new world of experience to mankind, but has opened the door to a new unexplored region. Cloudland with its beauties, wonders, awesome spectacles, inspiring panoramas, and extensive ranges of vision is relatively unnoticed by most persons. Nothwithstanding the fact that the sky is the only rapidly changing part of every landscape and that it is responsible for much of the mood of every seascape, it is seldom consciously noticed. This is still more surprising when we reflect that the sky is the weather factory which brings the blessings of sunshine and rain and the gorgeous mobile sunsets —the colorful symphonies with which Nature opens and closes the day. These and a hundred other important and impressive features of skyland prove that most persons pass along from day to day quite oblivious of much of the interest about them.

Even though flying tends to arouse every sense to alertness, many flyers do not open their consciousness or sensibility to the fairyland of clouds. And this is surprising again because the clouds are the mileposts on the highways of the winds. They are not only beautiful vaporous forms, but they visibly reveal the winds and the present and approaching weather, which mean so much to the plans and the safety of airmen. The new age of flying has dawned. Thousands of persons are on the verge of an introduction to this new world of the sky. It is hoped that these articles may aid in opening the consciousness of many of these to the utilitarian and esthetic interest of the clouds and other facts of skyland.

In attempting to describe the domain of clouds in feeble earthly words, one who has cultivated an intimacy with them cannot escape a feeling almost of irreverence. In a new world we may see new wonders and we may experience new thrills and feelings; but we are left with an alien language in which to describe them. The most that can be hoped for is that even inadequate words will by association bring to the imagination those sights, thrills, and feelings. Views of the clouds from an earthly viewpoint are full of interest for the observer with an open consciousness and an esthetic sensibility; but a knowledge of some of the scientific reasons underlying the formations and movements of clouds adds much to the enjoyment of them. Every day, every hour, and sometimes every minute exhibits a shift of scene. The sky may be perfectly clear, but in an hour great tenuous streamers of very high clouds may stretch across the sky from a point below the western horizon. These may tell the knowing observer that a general storm—a barometric low—is due in ten, twenty, or thirty hours. The cloudwise flyer who has an errand in the distant west will gather more information before he ventures forth unless his mission is an urgent one.

A morning may be very clear, without a cloud in the deep blue above. In an hour or so we may be surprised to find there are many wool-pack clouds abroad. These did not necessarily drift into our region from some mysterious place. Often they were created by the convection currents rising from the heated earth. The moisture-laden air rises, is cooled by expansion, and when the thinner, cooler air at its new high altitude of perhaps 4,000 or 5,000 feet cannot hold its original content of water vapor, the moisture condenses. Thus these wool-pack or fair-weather cumulus clouds, common on summer days, are born of the invisible world to which they are also constantly returning.

A close-up of the youthful thunderhead three miles high. The wool pack or cumulus clouds in the foreground are a mile high.

Mountains are fascinating to everyone. Those who live on the plains long for glimpses of them to break the monotony of their landscapes. The casual mountain-climber enthuses over the superb views from these high earthly places. The explorer thrills with the battle against Nature in his attempt to scale their heights. They introduce interesting variety into Nature's panoramas and into the lives of observant persons. What more nearly perfect place to live than along the shore of a great body of water with a rugged range of peaks in the background! Here is variety indeed—and this is the spice of life. The sea in front varies greatly in mood and it takes much of the expression of its countenance from the sky. It may be calm, reflecting the serene blue sky with the white clouds floating in it. It may be rough, but its expression varies with the character of the sky because the latter is always reflected in it.

The mountains in the background of this almost perfect place to live are now sunlit, now shadowy. They rear their crests upward into the domain of clouds, mingling now with storms, now with blue sky. They too take some of their expression from the sky overhead. When they are topped with snow we may sit in summer weather and look at winter in the distant heights.

How few of us know that the crests of many cloud-mountains are in winter climate? How many of us stop to think as we gaze upon some of the high clouds that they are in the region of perpetual zero weather? Still, with our new wings we may visit these climates in an hour. Looking back again upon our snow-capped mountains we may speculate that it would take many muscle-racking hours to reach their earthly crests.

All of us cannot live in the shadow of peaks, but if we learn to see when we look, we shall find that Nature brings wonderful and mighty vaporous mountains to us. The road to happiness and contentment lies along the pathway of variety, out of the plain of monotony. Landscapes change slowly with the coming and the going of the seasons, but the sky is an ever-present variable of dominant power. It has rightly been termed the countenance of Nature, for it lends its mood to the landscape below it and is ever changing its expression. The sky may be serene, cheerful, majestic, dull, sullen, angry or terrible. In all this variety, clouds play the most prominent role. Many of these vaporous sculptures are like fairy mountains. They are restless spirits coming into being and disappearing before our eyes. Those who will open their consciousness to the clouds and observe their forms and antics, and, better still, who will soar among them, will find that they have indeed discovered a new world—and that often it is fairyland.

The mightiest mountains of the sky are the thunderheads. In thunderstorm season, when the day begins hot, still and sultry, the cloud-wise will begin to look for the crests of these thunder-mountains to show faintly through the distant bluish haze before noon. In the distance they may appear insignificant, but what if those pinkish crests were of real earth poking up through that bluish haze? Would we not consider them to be high mountains? They are none the less high because they are vaporous. They are none the less interesting because they are floating, changing, and growing. It is one of the great thrills to fly up among such crests and over them. That is mountain-climbing worthy of the fairyland of the sky.

But let us return to our sultry day and the crests of distant thunderheads faintly shining in the sunlight and almost entirely enveloped in the bluish haze. As the day progresses, these crests may rear higher and higher, or they may float slowly away to be followed by others. By mid-afternoon a great thunder-mountain may have reared itself. To the casual observer it is an unchanging mere cloud, but let him photograph it each minute and he will see that it is ever-changing. Its crests are boiling; it is alive everywhere. To the keen observer, powerful upward air-currents are apparent by the boiling movements.

Perhaps it continues to mount higher and higher. Now one can scarcely miss recognizing the effect of the seething upward current which gives it a cauliflower crest like the top of a puff of steam projected upward. Such a mighty vaporous mountain poses for us many times each summer—sometimes for hours—but most persons pass it by with unseeing eyes. Certainly this would not be the case if this were an equivalent mountain of earth and rock. It would be a mighty mountain, indeed. But it is none the less high because it consists of condensed water-vapor. Sometimes these fairy mountains are as high as Mount Everest which, as yet, perhaps, has not been scaled by man.

Often these vaporous mountains which pose for us and thunder at us and shower us with rain and hail are higher above the surrounding plain from which they rise than any earthly mountain. Commonly, they surpass the mighty peaks of the Rocky Mountains. Still, they pose unnoticed by most persons. But after one has climbed up their valleys in an airplane and has passed through and over their snow-white crests, blindly brilliant in the sunshine, he will not look at them henceforth with unseeing eyes—unless his consciousness and sensibility are dead. These are the new thrills of flying and an awakened interest in the sky should be one of the greatest heritages of the experience of flying high in skyland.

If we watch the turbulent crest of this thunderhead, we sense the power of the updraft which pushes the peak higher and higher. The heated air from the earth rises, and cooler air from the heights takes its place. The crest of one of these thunderheads is sometimes as high as five miles. Above three miles the temperature is always below freezing over a great portion of the earth. This is a region of perpetual polar climate. The air in rising rapidly expands and this produces cooling. Doubtless the reader has noted how cool his fingers become at the open valve of an inflated automobile tire. This cooling is largely due to the expanding air. In a thunderhead this combination of cooling by expansion and high altitude is the cause of hailstones. Raindrops carried upward in the rising air freeze, and as these small hailstones fall they may be caught again in the updraft of the center of the thunderhead. Thus they may be carried upward where the layer of moisture upon them freezes. This cycle may be repeated again and again until the hailstone falls outside the influence of the central updraft, or becomes too heavy to be carried upward. It then falls to earth where we may pick it up, break it open and note the layers formed as described. The velocity of the updraft is estimated to be as great as twenty miles per hour. One only needs to view the boiling crest at a moderate range to conclude that the air is very turbulent. Over and among these crests, flying is often quite bumpy. But air cannot be going upward in these thunderheads without coming down in other places. Hence, dangerous downward currents are often encountered in the vicinity, although as a rule they are not of the high velocity as in the thunderheads. A knowledge of these currents is a good possession for those who wish to enjoy the thrill of climbing skyland ranges. In fact many lives have been lost through absence of such knowledge on the part of flying men.

Although these mountains of skyland are very fascinating from an earthly viewpoint, they are very much more thrilling and awesome from an aerial point of vantage. When the thunderhead moves over us and the thunderstorm is upon us, the sky may present a terrifying frown. Rain, hail, and foreboding gloom greet us on earth, but those who have been behind the scenes—miles above—know that on the upper side of this frown there is a silver lining. This black, angry thundercloud has a snow-white crest bathed in brilliant sunshine with a deep blue canopy of sky above it.

Let us visit these mighty peaks of cloudland by airplane, first visiting those pinkish crests which are barely visible in the distant bluish haze before noon. Contact! All clear! We soar upward into the blue. We climb steadily as we steer toward those pinkish crests rising clearer and clearer in the distance. At an altitude of one mile we find ourselves amid many small cumulus clouds—fleecy wool-pack clouds. We mount higher and higher and pass through this flock of vaporous white things floating like icebergs on a sea of bluish haze. Above, the sky is a deep, clear blue and these clouds rear their crests above the haze. Looking slantingly downward toward the horizon, we find it obscured by the great depth of haze through which our vision cannot penetrate. In the distance is a huge crag rearing itself far above the smaller clouds. This is a thunderhead in the

A thunderstorm in operation as seen from a plane at a high altitude.

making. It now appears as white and as brilliant as sunlit snow. It is no longer colored a pinkish hue as seen through the haze because we are viewing it in the clear atmosphere above the one-mile depth of haze.

We continue to climb upward and toward this great white crag. An altitude of ten thousand feet is reached as we approach this thunderhead in the making. Up we go until we pass over its crest. Our altimeter reads 12,000 feet. We look down upon the ice-pack for this now appears like a polar sea. The smaller clouds more than a mile beneath us appear flattened and between these snow-white areas we see faintly the very dark green earth below. It appears indistinct owing to the haze and to the glare from the brilliant white clouds. Our thermometer registers below freezing, although at the earth it was a hot day—nearly 90 degrees Fahrenheit. We wander here and there, but always on our return to the thunderhead we find it has reared somewhat higher. Finally, lunch beckons and we leave the crest at 15,000 feet to return later. We spiral rapidly downward, diving through the "ice-pack," and in a few minutes land in the sweltering heat. We are soggy with water which has condensed upon our cold faces and clothing.

The lunch-hour passes and we lazily watch our cloud-mountain in the distance from the comfortable shade of the hangar. Its snow-white crest has mounted much higher than when we first saw it. It is more distinct because we are looking at it at a higher angle, and therefore, through less haze. We know that its crest is now in the region of perpetual cold. Three or four miles upward is equal climatically to thousands of miles northward at sea-level. The base of the thunderhead is now much darkened. Sunlight can not penetrate the great depth of cloud. The bluish haze near the base is in deep shadow. Perhaps it is raining already, for we hear the faint rumblings of thunder.

Now is the time to witness it in action, so we don our warm clothing and prepare for a polar climb. We take off and are soon above the sea of haze which is usually about a mile in depth. What a majestic range of cloud-mountains greets our eyes! We mount higher and higher, slanting upward toward the crest. As we approach, the great white peak appears to grow larger. Up in these polar regions it is difficult to believe that the earth which we left a half-hour ago is sweltering in midsummer heat. We climb to the crest of this mighty mountain of vapor—over four miles high. That turbulent center, we know, is the genesis of rain, hail, and lightning. The thunderstorm is bestowing upon earthly mortals the blessing of rain, but it seems to exact a devilish reward in terrifying them as they fearfully look above at the dark, angry sky. Four miles above them we smile at the picture which our imagination conjures as we soar in glaring sunlight under a canopy of deep trembling blue. To those beneath, it may seem as though wind, rain, and hail are lashing the earth everywhere. To us with our extensive range of vision, this mighty thunderhead is only a part of an otherwise serene sunlit realm.

This mighty range of cloud-mountains is only one scene in the great panorama. On one hand the ocean

(*Continued on page 82*)

At an altitude of one mile—in the distance a thunderhead in the making.

Mapping Hispaniola From the Air

By K. M. Painter

IF you should visit the island of Santo Domingo—Haiti, as it is often called—today, and see the bridge at Limbe; the dam in the Arti Reuite Valley, or the hundred other monuments to economic achievement, it would be a different sight from that encountered by the United States Marines that were dispatched in 1922 to map the coast line of this, the latest protectorate of the United States. When Lieutenant C. F. Schilt marked this project as "finished business" and went to Nicaragua to obtain medals and glory he completed a task that was seven years in the doing.

From the time Columbus first sailed up the quiet waters of the Ozama River with his three seaweary caravels and secured his flagship to the trunk of a mighty tree on the river's bank, the Isle of Santo Domingo has been a land of adventure. What Hispaniola was in the days before the coming of the Spaniards is lost in the legends of the Indians, but since that time the very mention of its name has suggested a place obscure, where one might have adventure of almost any kind — of lost mines where the Spaniards got their gold—of hidden treasure.

The island charms all who gaze upon it. Set in a sea of deep blue-green water, with its palm fringed shores, broad savannahs, fertile plains and lofty mountains, cloud-topped, it lures back all who leave its shores. Columbus returned to spend his last days in the island he loved so well, and today his bones rest in the interior of the old cathedral at the capital. Attracted by the wonderful stories of the richness of the island many gentlemen adventurers of the Spanish Main, buccaneers and colonists flocked to its shores.

In the early annals of the New World the island of Santo Domingo, or Haiti, figured colorfully. First, fighting between the Spaniards and the Indians and the subjugation of the latter. Later, the intermittent raiding of the seacoast towns by the pirates or some country at war with Spain. Those early voyagers of the sea never dreamed that their descendants would behold voyagers of the upper blue passing over at incredible speed in "argosies of magic sail," as Tennyson so aptly puts it.

Near the water's edge, several hundred yards up from the mouth of the river, is the huge mahogany stump—all that is now left of the tree to which tradition says Columbus secured the "Santa Maria." If it could only talk all the world would listen in rapture. It knew the island when only the peace-loving Indians roamed its plains, climbed its lofty mountains and bathed in its clear cool waters. It saw the Spanish craft drift lazily up the river, and wondered; but no stranger thing did it ever behold than the first plane flying over, floating up there seemingly on nothing. It marveled at the sailing craft of the Marines.

And on this stage of romance and history, stepped aviation in a new role—the role of map-maker. Three scientific bodies were at work on the large order of correcting the Haitian map and locating strategic bridge and dam sites to irrigate the arid valleys: The Haitian Public Water Works, the topographical engineers of the U. S. Interior Department, and the U. S. Marine Corps. A three lens camera, designated as the K-3 was used in these first aerial photographic efforts. This camera took three shots with one operation—a direct shot, a left shot, and a right shot—so that more than two hundred square miles could be covered with one photographic strip. Could the weather

Eric Haquinias, topographical engineer (right) with Lieut. C. F. Schilt and two mechanics.

have remained constant, the project would have been finished in little time. But, it was necessary for the pilot to obtain an altitude of 10,000 feet so that sufficient area could be covered by the camera, and the clouds came in so early in the morning that by the time he had reached the vantage point it would frequently be too late—the island would be submerged in a blanket of fog.

Despite these adverse conditions, 300 to 400 prints were made each week, though more than 400 miles were covered daily to make these pictures. The development of the pictures was hampered by the lack of ice water—the scorching heat prevented the gelatin from hardening—and most of the negatives were sent to Panama for finishing. As each section was developed, it was fitted together to form a mosaic, necessarily accurate in every detail, and from this mosaic a new map was evolved. The Interior Department is making a topographical map of the island, and though this work has not yet been completed the mosaic recently submitted by Lieutenant Schilt is being subjected to the stereoscope for accurate measurement.

The trade winds around the northern coast of the island—across from Cuba — made flying in this area a difficult achievement and one aviator who made the trip from Port au Prince around the coast to Cape Haitien hit a bump that brought him down from 3,000 feet to 300 feet. He never flew this course again, for, as he said, even the birds walk around the point. Captain Harold C. Major, now information director of the Bureau of Aeronautics, was active in getting the Haitian project under way, and was the first aviator to make the trip from Port au Prince to Cape Haitien via the coast line route. However, this flight took eight days for he was forced down at Le Borgne by a water leak in the cylinders.

Depending upon wars for excitement, the natives were at a low ebb of amusement when the Marines brought their planes to the island. Having only glimpsed planes in the air, the Haitians thought they were no larger than big birds, and every time a pilot landed he was met by an interested throng of spectators. Flying from Cuba to Port au Prince, Captain Major alighted at Mole St. Nicholas to refuel his HS boat, and was met by a delegation headed by a parade of citizens in high silk hats and cut-away coats—wearing no shoes! He was taken with his companion to a thatched shack, the council hall, and royally entertained. Meanwhile, the populace loaded the plane down with pistols, revolvers, and swords—trophies of esteem. Being induced by the high-potentate of the city to fly across to Cap de Mole and visit a voodoo hut, Captain Major invited the citizens to hop on the plane and ride across. Of course, he could not raise with such a heavy load, but he anticipated taxiing across

The town of Hinche from the air.

the narrow body of water that divides Mole St. Nicholas from Cap de Mole. Taking off, however, he got on the step and the plane went about eight feet in the air—it was a wet lot of Haitians that finished the ceremonies.

Taking along a Haitian who was making his first flight, Captain Major was photographing the coast line about five miles south of Port au Prince when he saw several "black things" in the water. Getting down to 1,000 feet, he saw that these "things" spouted, and closer inspection proved them to be whales. Every plane carried a machine gun aboard, and Captain Major signaled to his passenger to shoot at the whales; but his only response was to crouch farther down in the cockpit and turn an ashy brown—there was no whale-hunting for this Haitian who never once looked over the side of the plane while it was off the ground. And this attitude was typical of the islanders who made obeisance to these "gods of the air."

Lieutenant Hayne D. Boyden, U. S. M. C., who relieved Captain Major, had his closest call while map-making in the Haitian area. As he expresses it: "This eventful flight came so near being my last, that it is hard to see why it wasn't." In company with Corporal Goldsmith, Lieutenant Boyden took off in a DH 5881 from Santiago at 11:15 a. m. for Santo Domingo City. It had been raining but had cleared up and the sun was shining. Though little rains were scattered about over the valley, this was often the case and they were easy to dodge.

When he came over Bonao Pass, which begins just beyond La Vega—seventy miles from Santiago toward the capital—he had six thousand feet and was just above scattered patches of white thunder-head clouds. The air was pretty thick, but he had been through when it looked much worse. Twenty-five miles east, down the mountain ranges, was another pass, but there was a low hanging cloud there. It was Lientenant Boyden's plan to go on over the Bonao Pass and get through to the south before the clouds got together in a big storm, but now, ahead, and to the east, a general storm seemed to be coming up. The top ran clear to the zenith—impossible to climb over. It was coming up along and over the eastern peaks of the pass, and also stretched itself over the pass ahead, but he was too high to look under the layer to see if it was raining from the cloud ahead.

Thus, he was situated: flying in clear sky; ahead and to the left this general black storm, below, the bottom of the pass and peaks. Westward, the white clouds were banked up thousands of feet until they covered the highest peaks, making a virtual wall to the top of the heavens. Behind and slightly below were scattered cloud banks, around and over which he had just flown. There were now only two things left to do: Go down through the hole in the clouds and look under and ahead to see if he could get through before the rain covered the whole face of the pass, or turn now, at six thousand feet, and return to Santiago.

Deciding upon the first course, he spiraled down through this hole in the clouds over the middle of the pass to twenty-five hundred feet. When he started down the rain seemed just coming across the peaks on the eastern side, but at twenty-five hundred feet nothing was visible but torrential rain ahead, so thick

The photographic equipment was carried in the rear cockpits of planes of this type.

Mole St. Nicholas—Note how black the water looks.

Cape Haitien as the mappers saw it.

that nothing could be seen through it. It was necessary, of course, to return to Santiago. The pass here was a little over two miles wide, and the plane had hardly nosed backward when it was enveloped in cloud and a moment later hit heavy rain. Up he climbed, circling because the mountain peaks were three thousand feet high on both sides. The hole in the clouds through which he had come down had blown over and intersected with the mountains. But this was not terrifying, for only three thousand feet above, was clear air; so he nosed up, opened his throttle, and expected to be up through it in three or four minutes.

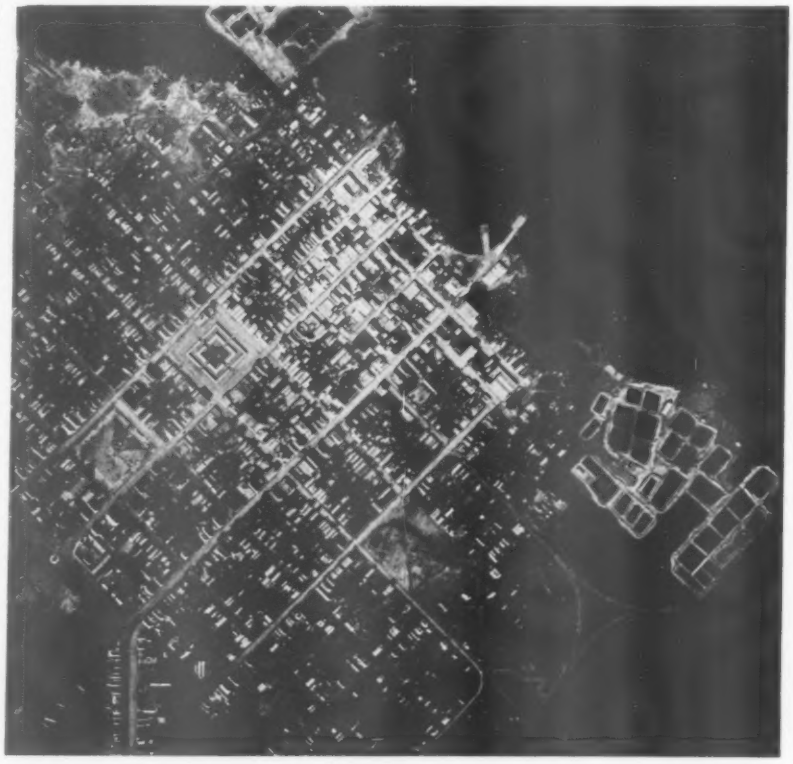
The air was getting very rough now, the rain was heavy, and the clouds were so dense that the wing tips were barely visible. A gust of wind hit the plane and tossed it down; with all his strength, Lieutenant Boyden couldn't pull her nose up. Then another hit, and tossed the plane to a stalling position! It was surely a tropical hurricane. Suddenly the stick came back, the nose fell over to the right, as if the leverage from the stick to the elevators wouldn't hold the plane up, and it fell into a right spin.

After falling a thousand feet, Lieutenant Boyden thought of his horizontal stabilizer. The angle of the horizontal stabilizer on a De-Haviland can be controlled from the pilot's cockpit by means of a wheel and connecting wire cable, this being a separate control and additional to the control stick and rudder bar. If the wheel is rolled back, it raises the trailing edge of the stabilizer which gradually raises the nose or climbing angle of the plane.

Kicking the rudder stopped the spin. Now the plane was in a nose dive. Rolling up the stabilizer and opening the throttle the ship gradually came into a level position, but before the stabilizer could be rolled down it kept climbing until it stalled off into a right spin. Rolling up the stabilizer for the third time, a mountain peak shoved itself up through the cloud. Lieutenant Boyden was looking over the right side and as he saw it, grabbed the stick and lifted the plane over with the ailerons from the banked-over position of a ship in a right spiral, opened the throttle, and the lights went out!

When he came to, he was lying on the trunk and branches of a tree that the ship had knocked down. It was raining. The corporal, inactive throughout this battle for life, was sitting over him. "What time is it?" asked Lieutenant Boyden. "Two

Gonaives — From prints like these Lieut. Schilt made up the mosaic map of the island.



o'clock," replied the corporal. The storm had caught them in the pass at twelve, they had climbed for fifteen minutes; and had been unconscious for more than an hour and a half.

In describing his sensation at finding himself alive, Lieutenant Boyden continued: "Corporal Goldsmith then told me that he had come to thirty minutes before, hanging upside down in the rear cockpit, and had then dug himself out, for the fuselage was crushed upside down against the mountain side. Then he dug in for me and found me still strapped in. Hanging by my belt upside down, he'd pulled me out, whether from underneath or through the broken side of the cockpit, I don't know. I do know, that the facial paralysis suffered as a result of this crash has left me stone deaf."

Every pilot who flew in Haiti made a point of looking down on Tortugas Island, better known, through Robert Louis Stevenson, as "Treasure Island," the habitat of pirates. Shades of Long John Silver—an airplane! The romantic daredevils of history would have good cause to turn over in their watery graves. The Citadel of Christophe, high in the Gold Mountains of Haiti, was another high-spot of adventure. To see this citadel it was essential to have a plane or ride a mule up the mountain side. Captain Major heartily recommends both views. By plane one glimpses the magnitude of the fort, but only ground inspection reveals the cannons dated 1774. The legend of Christophe is part of the history of Haiti, and the story of his surrender to the British Admiral who threatened to train his guns 20 to 30 miles in the air and demolish the fort, is the story of childlike simplicity coupled with a spirit that conquered northern Haiti.

Off the eastern coast of Haiti lies the Island of Gonave, and to this island the marine sergeant made immortal as "King Leatherneck" piloted Captain Major to point out an emergency landing field that he had discovered. Some few days later, when Captain Major was flying along the coast he had good reason to be grateful for this information. The water connection of his plane came off and necessitated a forced landing. No field was in view, but he recalled the Island of Gonave. To this deserted spot he turned his plane and made a forced landing. After ten days of hermitage, a pilot located him and took him safely to mainland.

And, standing out in bold relief against the background of romance and adventure is the praiseworthy work done by these map-makers. The watershed of each river was checked, the volume and course of each determined, and by looking at the finished mosaic it was not difficult for the Haitian Public Water Works to locate irrigation projects at the most strategic points. Over 50,000 prints were made of the island, one set of which went to the U. S. Department of Agriculture, where farming methods best suited to the climate and soil were considered. As a result, Santo Domingo today has a negative number of "cacos" or bandits, and an abundant crop of cotton and coffee. Roads were determined by referring to the air-photographs, and an accurate topographical map of the island is now being completed. The last seven years history of Santo Domingo is replete with progress. And, in step with the progress of Santo Domingo is the progress of her agent of success, the airplane.

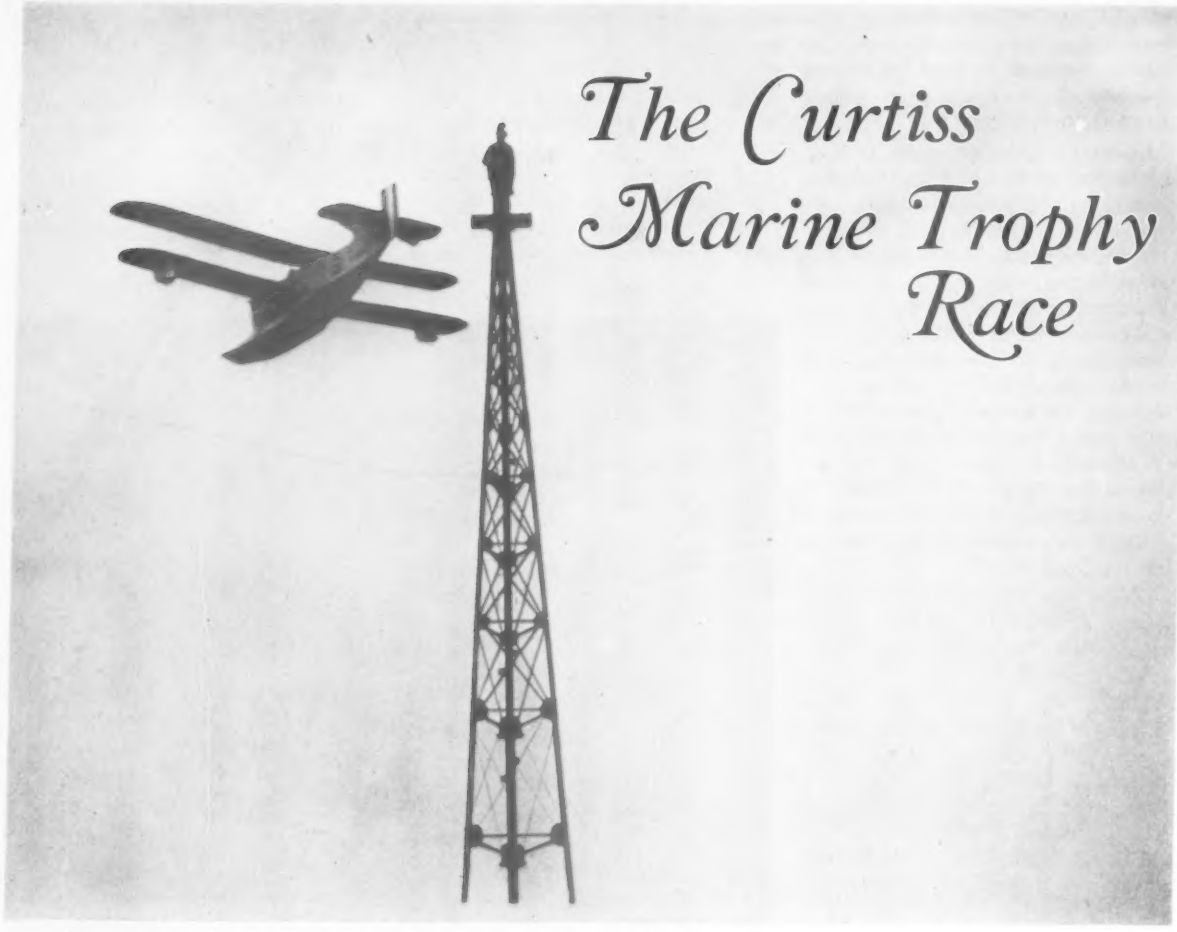
Port-au-Prince, Haiti

Anyone Can Fly

A legless and one-armed pilot has been added to the long list of Eaglerock purchasers according to the Alexander Aircraft Co., Denver. M. R. Daugherty, known as the "Minus Man," in New Martinsville, W. Va., is the handicapped flyer. He has had forty hours solo flight in a specially equipped training ship under Lyle H. Scott, Eaglerock distributor in Marietta, Ohio.

Daugherty found that being shy a few members did not require him to stay on the ground and he has proved an apt pupil in his chosen profession. The Eaglerock he recently purchased has been equipped with a motorcycle handlebar grip joy stick which enables him to open and close the throttle and operate ailerons and elevators without removing his hand from the control. The rudder pedals have been extended so that he can reach them comfortably with his leg stumps. Daugherty will use his Eaglerock for advertising purposes. Incidentally, lots of men buy and fly ships with less than Daugherty's forty hours.

The Curtiss Marine Trophy Race



Lieutenant Grow in the Loening Amphibian that won the race for its class, rounding the course marker.

AGAIN the Marines have the situation well in hand—this time the racing situation. Over the top with flying colors went Major Charles A. Lutz of the U. S. Marine Corps to capture the glory and honor that went with attaining 157.60 miles per hour in the Curtiss seaplane races recently held at the Naval Air Station, Anacostia, D. C. Incidentally, the gray-haired veteran, three years this side of the half-century mark, emerged from comparative obscurity when, as an eleventh-hour entry in America's seaplane racing classic, he flashed his skill as a pilot of high-speed single-seater fighting planes above the Potomac River for 30 minutes and romped away with the coveted trophy.

In addition to capturing the seaplane classic of America, which happens to be the only major aircraft racing competition of any kind scheduled in the East for 1928, this dark horse—who learned to fly five years ago at the age of 42—walked off with the Warner Cup. This cup, offered by the Assistant Secretary of the Navy for Aeronautics, Hon. E. P. Warner, was to be presented to the pilot flying the most nearly perfect race—whose actual performance most nearly approached the record listed by the trial board reports. Not only did Major Lutz "most nearly approach" this record, he overstepped it by 2.60 miles!

Close on the winning pilot's rudder was Lieut. Comdr. A. C. Miles of the flight test section, Naval Air Station, Anacostia, who in another Curtiss "Hawk" covered the distance at an average speed of 154.10 miles per hour. Captain Harold C. Major, U. S. M. C., of the Bureau of Aeronautics, also in a "Hawk," flew third at an average speed of 151.72 miles per hour. Both of the "runners-up" had Pratt & Whitney "Wasp" air-cooled engines of 400 horsepower, while the major's ship had a Curtiss D-12 water cooled power-plant of like power—incidentally heavier than his closest competitors.

Ranking next in speed to the single-seaters were the two Vought "Corsair" fleet-spotters, also equipped with "Wasp" air-cooled engines. Lieut. Comdr. Harris was fourth in the order of finish and Lieut. Comdr. Ralph Davison of the Bureau of Operations, Navy Department, was fifth, with a speed of 145.43 miles per hour. Both planes had just emerged from the factory and their engines had had only 2½ hours in the air before entering the race. Neither pilot, therefore, ran at full throttle for the entire race, but of necessity "nursed his engine," although at times they were thrown wide open.

Lieut. Grow, in the amphibian class, was sixth; Lieut. Comdr. George Chapline, Bureau of Aeronautics, was seventh at 11.54 miles per hour, and Lieut. DeLong Mills of the Naval Air Station, Lakehurst, N. J., was eighth at 115.40 miles per

hour. The other entrant in this class, Lieut. H. C. Busby, U. S. M. C., of Brown Field, Quantico, Va., flying a Liberty engined Loening amphibian left the race on the third lap with engine trouble.

Lieut. Gallery, in the torpedo and bombing plane class, was ninth; Lieut. W. J. Slattery was tenth at 104.47 miles per hour, and Lieut. R. W. D. Woods eleventh at 101.95 miles per hour. The slow training planes drew up the rear, Lieut. Tomlinson leading the group for twelfth place in the order of finish; Lieut. M. R. Browning taking thirteenth place at 93.29 miles per hour, seven-tenths of a mile behind Tomlinson; Lieut. R. E. Blick landing fourteenth place at 84.88 miles per hour, and Lieut. J. A. Pennington, coming in last at 88.70 miles. A fifth plane in this group, piloted by Chief Boatswain G. F. Kahle, dropped out on the fourth lap owing to mechanical trouble and taxied back to the station under its own power.

Despite the festive air which prevailed among the spectators at the races a cloud hovered over all the pilots. For less than a week ago Lieut. Frank R. Buse of the Anacostia station, who was to have flown the "Corsair" that held the World's altitude and "speed under a load" records for seaplanes, was killed in practice. Lieutenant A. P. Flagg of the Bureau of Aeronautics, was to have taken his place in the races, but he was delayed in New York because of flying conditions that prevented his taking off.

The planes got under way in a spectacular and orderly fashion, Carl F. Schory, secretary of the contest committee of the National Aeronautic Association and head timekeeper of the race, had devised a plan whereby it was up to the pilots to pass over the starting line on time or suffer the consequences in time deduction. He saw to it that all the airmen's watches were checked with the official timepiece and then each group was assigned its minute to cross.

Major C. A. Lutz, winner of the Curtiss Trophy and Warner Cup.

Half an hour before the time scheduled to start, the five groups took the air and milled about to the south of the Anacostia station. Lieut. Browning came chugging up the river in his training plane, the advance guard for his group. The others soon followed, crossed the imaginary line running from the aerology building on the station to a point immediately across the Anacostia River, turned around the north pylon, represented by a tug anchored to the west, and headed down the river.

Then came the three big Martin torpedo planes, their single-engined 800-horsepower Packards and their screaming propellers sending out a deafening roar. Close behind were the next fastest, the Loening amphibians. They, like the others, in single file, rounded the pylon. The "Corsairs" were fourth to appear and their advance in speed over the others was noted instantly. While they seemed fast, the last to fly over —the "Hawks"—were faster. The race was on. It was but a matter of a few minutes before the parade of the Navy's service planes, the ones used in daily naval aviation duties, would be around again. Here came a plane. It was piloted by Browning, closely pressed by two torpedo planes in the hands of Slattery and Gallery. These huge machines were on the first lap of a neck-and-neck race that continued until the end. All through the race they hugged each other closely, finally ending in ninth and tenth position with a little more than one mile per hour separating them in space. Tomlinson then appeared and rushed around the pylon, hard pressed by two amphibians in command of Chapline and Mills. Another bomber, still another training plane, two amphibians and then the "Corsairs."

Both Harrill and Davison cut the home pylon close; so close, in fact, that it worried them as they sped down the river, and before they were well under way for the southbound trip both turned around and banked around the turning point to make sure. Miles and Major brought up the rear for the first lap. While the spectators were watching the turns at the home pylon, Maj. Lutz was making "miles-per-hour" down and up the river, and before it could be realized, he had taken the lead for the third lap. This he maintained until the finish. The two other "Hawks" in the race held their own against competitors, and the "Cor-

Lieut. Daniel V. Gallery, winner in the torpedo and bombing plane class.

Lieut. W. G. Tomlinson, winner in the training plane class.

Left to right—Porter Adams, Secretary Wilbur, Orville Wright and Major Lutz.

sairs" took their rightful place in line after passing all slower craft. As the race neared its close, the starting order gradually took reverse form, the fastest planes being in the lead and the slowest in the rear.

While Maj. Lutz was the center of interest because of his speed and the graceful, efficient manner in which he made his 180-degree turns, the other pilots, without exception, drew admiration for their banks around the turning point. Outstanding among these were the big bombers, which are not called upon for pursuit plane maneuverability. Their pilots banked the big "10-ton trucks" over on their wings at an altitude of about 50 feet off the water and roared along.

But Maj. Lutz was the hero of the day and his brilliant performance brought words of commendation from Secretary of the Navy Wilbur, who presented the handsome Curtiss trophy, and Mr. Warner, donor of the cup bearing his name. He was roundly cheered by a throng that rushed to the water's edge in front of the seaplane hangars as he taxied his little Curtiss "Hawk" pursuit plane up to the "apron" after having gleefully roared across the finishing line far in advance of the other entrants, pulled up into a climbing turn, and made a neat landing on the Anacostia River.

With only two pylons, the race was considered much more difficult than either the Schneider or Pulitzer races, whose courses are triangular and with consequent easier turns. It is, therefore, with just pride that Major Lutz can point to his name on the Curtiss trophy as it reposes in the Navy Department, bearing the name of each winner on its base. But this veteran of many a Marine Corps expedition is most overjoyed because he made good his promise that he would "trim" the "kids" in the race. Ever since he became an entrant—just three days ago—the major has been championing the speedy "Hawk" which is assigned to him for his official duties as Commandant at Brown Field, Quantico, Virginia. "That ship is the fastest one in America," he told the less optimistic pilots. "It can lick anything. On wheels it's a streak of lightning, and it is not very much slower with floats."

From start to finish, Maj. Lutz flew a remarkably consistent race, even though the 20-mile course between the War College and Fort Hunt was clogged up from time to time with slow-flying planes. The speed for the first lap was 157.41 miles per hour; for the second the speed was averaged with the first to give 147.30; for the third it was averaged with the first and second to give 157.57; for the fourth the average was 157.58 and for the fifth it was 157.60. The exact lapse of time from the starting point to the finishing line—after covering 100 miles—was 38 minutes, four and two-tenths seconds.

The fleet at Hampton Roads, the test pilots at Anacostia, D. C., and the Marines at Quantico, were invited by the Bureau of Aeronautics to compete in the race, and the matter of selecting pilots and planes was left to each group entrant. Novel, indeed, was the method adopted by the Anacostia station. Slips representing the available planes were placed in a hat and the eligible pilots, with no little concern, drew their fate. Lieutenant Tomlinson—crack racing pilot, famous for his "overtime" flying in the Schneider cup races, when he piloted a standard Curtiss "Hawk" against the speediest racing planes in the world and averaged 100 miles slower—drew a Con-

solidated training plane, with a maximum possible speed of 92 miles per hour. Less famous speed-pilots drew the faster ships. There was much quaking at the station when the rumor started that Lieut. Tomlinson would, despite his "bad draw," receive one of the faster ships. This rumor proved unfounded, and all hands "stood pat."

When the timers had completed their computations and announced the various winners, the presentation ceremony was held on the lawn behind the administration offices of the Anacostia station. The big trophy, a magnificent silver thing of rare workmanship, was presented Maj. Lutz by Secretary Wilbur with a few words, in which he praised the skill of the pilot. Mr. Warner then announced that he had awarded his cup to Maj. Lutz for the best corrected time, not waiting for the timekeeper's official check, so sure was everyone of the Major's unrivalled field. Mr. Warner also presented the gold wrist watches—offered by the Washington Star newspaper—to the five group winners.

The presentation of awards was witnessed by members of the contest committee of the Aeronautic Association, under whose auspices the event was held. They included Orville Wright, chairman; Dr. George W. Lewis of the national advisory committee for aeronautics, vice chairman; Porter Adams, president of the association; Rear Admiral William A. Moffett, chief of the Bureau of Aeronautics, and his assistant chief, Capt. Emory S. Land; William P. MacCracken, Jr., Assistant Secretary of Commerce for Aeronautics, and Glenn L. Martin, pioneer aircraft manufacturer. Chance Vought, builder of the "Corsair"; Capt. Burdette S. Wright, representing the Curtiss Aeroplane and Motor Co., and George S. Wheat, representing the Pratt and Whitney Co., also were present.

Lieut. H. B. Grow, winner in the amphibian class.

Lt. Cdr. W. K. Harrill, first in Vought Corsair class.

While the race was difficult for the layman to follow, interest was maintained by a program of maneuvers. Before and after the race Capt. F. O. Rogers, on duty at marine aviation headquarters, gave a thrilling performance of airplane acrobatics in a "Hawk." Aviation Chief Machinist's Mate W. F. Scott jumped 1,500 feet from a plane and floated to the center of Bolling Field. Lieutenant R. L. Johnson, flying a smoke-laying "Hawk," sped across the water with his smoke screen. Much more difficult than watching a three-ring circus is this aviation racing business as more than 20,000 strained necks will attest. If this is to continue we'll have to develop a new set of muscles or go in for periscope production on a large scale!

Airway Lighting

Lights for the western half of the transcontinental and other western airways have been purchased by the Department of Commerce the Aeronautics Branch announced. Three airways will receive 250 rotating beacon searchlights, the San Francisco-Salt Lake section of the transcontinental, the Los Angeles-Salt Lake and the Louisville - Cleveland Airways.

These lighting facilities will provide for a change of schedule so that mail collected at the end of any business day on the Atlantic seaboard or Pacific coast will reach its destination with a loss of but one business day, the schedule providing for flying two nights and one day. Night flying will take place from San Francisco to Cheyenne and from Chicago to New York under the program of the Department. Intermediate landing fields will be provided 30 miles apart and beacon lights will be spaced approximately 10 miles apart. The beacons are identified by route designations based on the names of principal terminal cities and mileage numbers, painted on the roof of the power sheds.

The new beacons were designated by the Airways Division of the Department of Commerce after operating experience with equipment supplied by manufacturers and incorporating the superior features of all types of equipment. The searchlight beacons are fitted with a 24-inch parabolic mirror and 1,000-watt airway lamps developing 2,000,000 candlepower. The revolving mechanism is motor driven, providing a flash of light every ten seconds.

For controlling course light projectors pointing along the route and flashing the code numbers of the beacons for identification from a distance, auxiliary contactors are provided in the mechanism. A lamp exchanger is furnished so as to provide uninterrupted service in case of lamp failure. The beacons are mounted on 51 foot skeleton towers, at the bases of which are concrete arrows 56 feet long, pointing out the direction of the course and painted chrome yellow.

Germany in the Air

By Paul E. Lamarche, Jr.

A Junkers G-31 equipped with three Bristol-Jupiter air cooled engines taking off from a German airport.

WHEN one considers commercial aviation in Germany one must properly place her in a class by herself, since the development of her commercial air fleet has been due to very exceptional circumstances with which her competitor nations did not have to contend. The building up of Germany's air lines has been achieved in face of obstacles that would discourage any but an exceptional people, and it is something that has made Germany the cynosure of all eyes in Europe. The commercial air fleets of France, England, Holland and other nations have been wonderfully developed, yet wonderful as they may seem and despite the fact that these nations have enjoyed many advantages over their German competitors the Germans stand out ahead of all of them. Her development of commercial air lines has in many ways been one of the most remarkable of its kind in Europe and something of which the German people may well be proud.

When the Treaty of Versailles was signed Germany, according to article 198, was not allowed to "maintain or possess any military or naval air forces" and was forced to stop production of aircraft for a year. Later, in 1921, the Allied Powers, finding that the original restrictions did not achieve their ends, imposed additional restrictions. These pertained to the number, size and performance of all types of German aircraft. They prohibited, for example, the building of single seater planes with motors of more than sixty horsepower. Likewise all planes whose ceiling could exceed 12,000 feet, as well as planes which at an altitude of 6,000 feet and motors at full speed could do better than 170 kilometers an hour (106 m. p. h.), were prohibited. The Treaty also limited the useful load, making it practically impossible for the Germans to build a machine practical for commercial purposes, while other restrictions all but stifled Germans' efforts to develop any kind of an air fleet. The reconstruction of what remained of her war time fleet, which was almost completely destroyed during the war, was the only means of carrying on in the air, and even this was not without its limitations.

In face of this the Germans, ever a progressive people, went to work and have built up the magnificent system that now spreads a network over a large part of Europe. Germany, after the war, realized that commercial aviation was the only form of flying left open to them and they set about to build up an air fleet of commercial planes. In the beginning bankers, industrialists, municipalities and even thousands of individuals contributed towards subsidizing commercial aviation. Many towns subscribed sums of money ranging from 300 to 400,000 marks. Cologne is said to have contributed 200,000 marks and Hannover 300,000 marks towards this end. In 1919 the *Deutsche Luftreederei* inaugurated a passenger service between Berlin and Weimer and shortly after its inception received the co-operation of the *Hamburg-Amerika Linie,* the *Frankfürter Metall-Konzern* and other companies interested in aviation. This support eventually enabled them to extend their services to Hamburg despite the limited financial resources. In 1920 the German government, realizing the importance of the development of air lines,

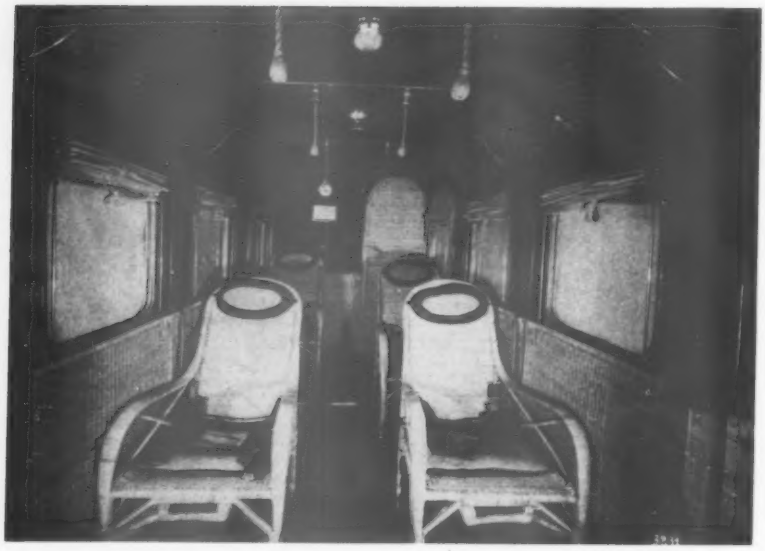
granted this company a subsidy. With the granting of this subsidy, which was not a large one, a number of other companies interested in the exploitation of commercial flying immediately sprang into being, expecting the government to grant them subsidies as well, and as a result competition grew fierce.

To put it briefly, this competition became a case of the survival of the fittest, and in 1923 practically all commercial flying in Germany was operated by two large organizations, who represented consolidations of many of the smaller lines, due to economic conditions. These were the *Deutscher Aero-Lloyd* and the *Junkers Luftverkehr Algemeine Gesellshaft.* In 1925 the German government urged these two companies to merge, and in 1926 the merger was completed and formed what is now the *Deutsche Luft Hansa* and which is the exclusive German commercial air organization. During the time from the inauguration of commercial air lines in Germany to the present development the Allied Powers have removed some of the obstacles they have placed in their way, and as a result of meetings that took place in 1925 German commercial flying now enjoys almost the same freedom as other nations, although as yet military flying is under restrictions. The first international air line established by Germany was between Copenhagen, Hamburg, Amsterdam and London. The *Deutsche Russische Luftverkehrs Gesellschaft* later opened up a service between Königsberg and Moscow. These international lines, as well as others and the fast growing internal lines, all became a part of the new centralized and government supported air company.

A Roland Rohrbach tri-motor monoplane. Note how far ahead of the wings the three B. M. W. motors are placed.

The *Deutsche Luft Hansa* system is now one of the greatest commercial air companies in the world. It has a capitalization of 25,000,000 gold marks. In 1926 the German passenger services showed a credit of 6,922,950 marks, although most of the profit earned during that year had to be written off against depreciation. The debit side of the ledger showed a deficit of 1,247,862 marks. In 1926 the planes of the Luft Hansa system carried 56,268 passengers a distance of 6,141,479 kilometers, while French planes carried 18,800 passengers a distance of 5,220,000 kilometers and 26,721 people were carried on English wings. Approximately 97,000 passengers were carried on the Luft Hansa planes during 1927, and this year will undoubtedly see more than a hundred thousand passengers carried. Thus it can be seen that in Germany's present development they are carrying more passengers per year than her greatest competitors, England and France, combined. Early in 1926 the Luft Hansa, then a new company, operated over thirty routes. Six months later it operated 54, and at the end of last September it was operating 70. In 1926 there was an increase of 50.3 per cent in the number of passengers over that of 1925. This same year also showed an increase of 115 per cent in the tonnage of freight carried, while the increase in the use of the mail service was 86.4 per cent. These figures give an excellent idea of the extent to which flying has become popularized in Germany. It will be noted, however, that much of this great increase in German air traffic took place after 1925, when Allied restrictions were lessened considerably, while at the same time the organization of the Luft Hansa gave the development of these lines an added impetus.

Six passenger Dornier Merkur. Note the absence of all wires on these planes—control bars being used.



Cabin of Dornier Merkur. Note straps overhead for passengers to hold when moving about—also seat straps, a legal requirement.

Geographically Germany has a great advantage because their position is central and Berlin's *Tempelhof Flughafen* (air field) might well be said to be the hub of continental flying, for from here lines radiate in all directions. Among some of the important international lines that go from this field are those going to London, Paris, Vienna, Brussels, Moscow, Prague and Amsterdam. An example of the importance of the Tempelhof field is shown in the fact that in August of 1927 6,677 passengers made use of the field, while 1,069 planes landed and 1,068 planes took off in the same period. Likewise during this time 89,250 people visited the field, an excellent example of the great interest that German people take in flying. Planes from the Berlin airport serve 19 other ports on regular air routes. Next to this field in importance are those of Essen and Hamburg. There are at present almost a hundred airports used by the Luft Hansa system when running on their augmented summer schedule. Of these about twenty are foreign, while the remainder are found within the German boundaries. And while Berlin is the principal of these, those at Cologne, Halle-Leipzig, Munich, Stuttgart, Frankfürt and Hannover are of great importance. At some of these ports connections are made with foreign services, but in most cases German planes extend their services beyond the frontiers and at present furnish international air services to France, England, Belgium, Holland, Switzerland, Austria, Hungary, Poland, Russia, Denmark and Sweden, while they are planning a Spanish service in the near future.

The *Deutsche Luft Hansa* system has standardized on the use of several different makes of planes, using them according to the nature of the route or the distance to be flown. The principal plane used on the longer routes and in practically all of their international lines is the well known Junkers, which is built at Dessau. The Junkers is a cantilever wing monoplane of all metal construction, duraluminum being used in place of the fabric. It is the present tendency of the Germans to build all of their commercial planes of all metal construction. Of the Junkers planes two principal types are used. One of these is the F-type, a single motor cabin plane that seats six passengers. The second type is the G-type, a large three motor plane similar in construction to the F-planes, but considerably larger. These G-planes seat from eight to twelve passengers. The latest of these is the G-31 plane, which is equipped with three Gnome Jupiter motors. Plans are now on foot to build a new type of Junkers, which will be called the J-1000 type. This plane will have four motors and will use a mixture of petrol and creosote for fuel. The newer models are being built to replace the old Junkers planes, whose specifications when built were in keeping with the restrictions of the Allies and whose performance, while good, is greatly surpassed by the latest G-31's. The Dessau works of the Junkers company are in themselves a remarkable plant and much of the town's population has an interest in it. Practically the entire Junkers plane is a product of this plant, including the motor, and it is on a smaller scale comparable in many ways to the Ford plant in Detroit. Their planes are in use all over the world and have in particular found much favor in South American countries.

Other types of planes used on the air routes of the Luft Hansa system

Duberdorf field at Zurich, Switzerland. The Junkers trimotor is bound for Munich, the Handley-Page at the left for Basle, Paris and London, and the Dornier for Breslau.

are the Albatross, the Dornier, the Rohrbach, the Fokker, the Udet, the Focke-Wulf and the Heinkel. The Albatross planes used by this system are unique, inasmuch as they are used as a flying sleeping car, being equipped to accommodate six passengers in the same manner as in a railroad car. These twin-engine biplanes are used on the night services between Berlin and Moscow and Berlin and Hannover. There are several types of Dornier planes used, among them the *Dornier Merkur,* a fast monoplane that carries eight passengers and two pilots, having a 450 h. p. motor for its propulsion. The *Dornier Komet* is almost the same as the *Merkur,* though considerably smaller and used on short routes. The large *Dornier Wal* and *Super Wal* flying boats are used principally on the *Boden See* or Lake Constance and in services in co-operation with the Swedish Lines in the Baltic. These big monoplanes are equipped with two 360 h. p. motors over the wing in the center, arranged in pusher and tractor formation. The new *Super Wal* planes are furnished with four air cooled motors of 480 h. p. each arranged in the same manner and have passenger accommodations for twenty-three. The *Dornier Merkur* is also adaptable for use as a seaplane when equipped with floats in place of the landing gear, and several of these have been used over small water routes. All of the Dornier planes, like other types of German commercial planes, are of all metal construction. The Rohrbach, such as is used for commercial purposes, is a large tri-motored all metal monoplane whose 230 h. p. B. M. W. motors give it a maximum speed of 120 m. p. h. The *Rohrbach Metall-Flugzeubau,* builders of these planes, also produce a large flying boat whose lines and characteristics resemble the *Dornier Wal* boats. Two types of Udet planes are used, one being a small four passenger plane, which is equipped with a single motor, and the other an eight passenger four motor plane. There are very few Focke-Wulf planes used, but those that are in service carry either three or five passengers, according to the type used. The three passenger plane is unusual inasmuch as it uses a single motor of but 75 h. p. The Heinkel is a large biplane furnished with a single 500 h. p. B. M. W. motor and is built especially for carrying freight, although it has accommodations for two passengers. A few Fokkers are used by this line, but the Fokker, being a Dutch product and no longer constructed in Germany, does not enjoy the popularity of the wholly German built planes.

A Dornier-Merkur equipped with pontoons taking off from Lake Constance (Boden See). Note larger rudder used.

Side view of Junkers G-23. All possible bracing is internal avoiding unnecessary resistances.

Gradually the Luft Hansa company is replacing their flying stock with newer and larger planes but many of the present planes have five years and more of flying to their credit and are quite capable of flying on for some time to come. Since all of the planes used on these lines are standardized the parts are easily interchangeable thus facilitating the upkeep and repair of the flying equipment. Everything for the comfort of the passengers has been considered in the construction of these planes and travel in them is as comfortable as in a railroad train. In some of the newest of the all metal Junkers the writer was surprised to find an ash tray at each place and the privilege of smoking in an aeroplane can be enjoyed by any of the passengers. In winter time the service does not become any less comfortable due to the cold for all of these planes have heated cabins, obviating the necessity of wearing special clothing. On some planes the heating is by hot water circulating from the radiator while planes equipped with air cooled motors are heated by the exhaust.

One noticeable characteristic in

A Dornier-Merkur in the Chekoslovakian service. Behind it is one of the older type of Fokkers.

German commercial flying is the fact that water cooled motors are used in greater numbers than the air cooled radial motors such as are used to a great extent in America and on the air lines of many European countries. Within the past year, however, the use of the air cooled motor has been greatly increased and the newest Junkers and Dornier Wal planes are so equipped. The majority of air cooled motors that are now used on the larger planes are foreign products being of English or French manufacture. On asking how long motors are used on the commercial planes, the writer was informed that on some of the older planes there are motors that have been running for more than four hundred hours in the air and are still being used. The air technicians expect four hundred hours of service from most of their motors but after that the use for further service depends on the condition after one of the overhauls that they are periodically given. The Germans do not limit the use of the motors to any definite length of time but simply use them continuously until their mechanics detect any trouble during the regular inspections. While most of the smaller planes are started by hand the motors on the larger and multi-motored planes make use of compressed air self-starters that work very efficiently.

The Junkers planes, as has been stated, use motors built in the Junkers plant but in some cases these planes are equipped with two different makes. On some of the three motor planes the center motor is a B.M.W. motor while the two side motors are Junkers, all of them being 400 H.P. The latest type Junkers, the G-31 is equipped with three French Rhone-Gnome-Jupiter air cooled motors and it is the first type to adapt the air cooled motor. The B.M.W. motor is one of the best and most used of the German motors on planes other than the Junkers, who only make partial use of them. On the Albatross planes two 240 H.P. B.M.W. motors are used while the *Dornier Merkurs* make use of 450 H.P. B.M.W. motors. Many of the smaller planes make use of the Siemens motors which are either 75 or 100 H.P. Of the foreign motors, of which many are in use, the English Rolls-Royce motors are perhaps the most used. Many of these are used on Dornier and Rohrbach flying boats as well as on the *Dornier Merkurs*. The few Fokkers that are in use are equipped with Rolls-Royce 360 H.P. motors while one or two have the English 240 H.P. Siddeley Puma air cooled motors for their motive power.

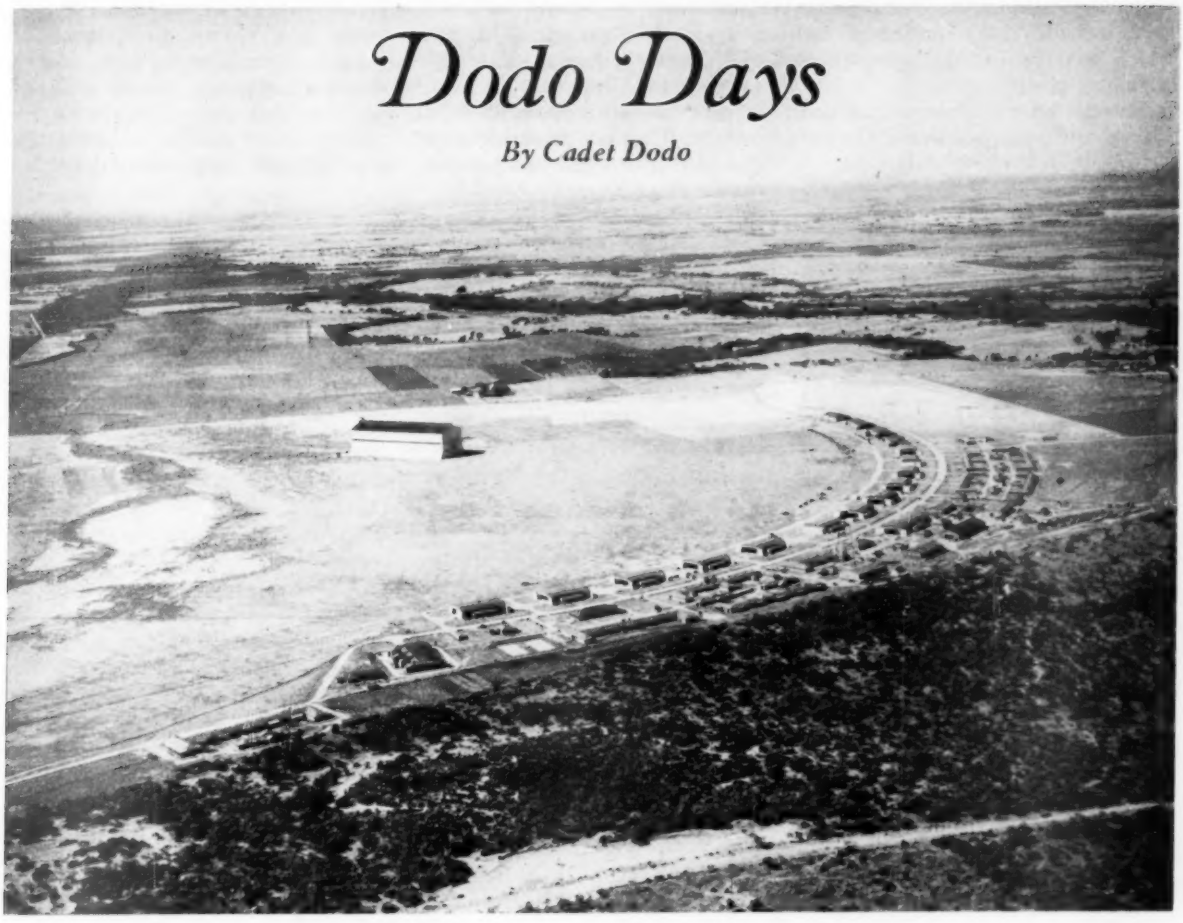
During the war Germany had 77 aircraft factories which could turn out as many as 2,000 planes a month as well as 45 motor factories and 2 dirigible construction works which altogether employed 140,000 workers. There are now in Germany aside from the big Junkers plant, twelve major aircraft factories engaged in the production of planes and motors. When the restrictions imposed by the Treaty of Versailles were in effect German engineers were able to build planes in Sweden whose specifications were such that they could not be constructed in Germany. The question has often been asked whether these huge commercial aircraft now being used over air routes in Europe could not be converted into warcraft in time of war. Some of these planes undoubtedly can be so converted and this is also the case with certain types of commercial planes used by other nations as well. Not all types of commercial aircraft are, however, adaptable for such conversions but the Junkers perhaps would be the easiest of all types to prepare for hostile purposes. One of these was recently built in Sweden as a war plane and is a veritable flying fortress. The fact that the German tendency is to build all metal

(*Continued on page* 80)

A Junkers F-13 six passenger cabin plane on the Oberwiesenfeld, the Munich airport.

Dodo Days

By Cadet Dodo



Cadet Life at Brooks Field

By Cadet Dodo

"BAY—Attention!" A mad scramble, and, as dozens of young cadets jumped to their feet and stood at attention, the officer of the day walked through the bay on one of his tours of duty.

"Say! you fellows better snap to it! What's the matter with you? What's your name, 'Mister'?" he asked, turning to one of the slower members of the group. "Why don't you stand at attention when I go through?"

"Atheny, sir. Sorry, sir, but I was reading intently and didn't hear."

"You didn't hear, hey! Well, three demerits for you. Did you hear that?"

"Yes, sir."

"All right, see that you snap out of it from now on, or you'll get the devil gigged out of you. Carry on!"

After this second command, which was really permission to be at rest, the statue-like forms again took their natural positions from which they had so suddenly been disturbed.

The tall, blonde-haired youth broke the silence. "If that isn't just my luck. That makes seven gigs for me this week and there are two more days to go. I'm sure of two 'tours' this week."

"That's all right, Atheny, don't mind that, the exercise will do you good," was the none too encouraging comment of a luckier comrade who had not as yet received a demerit for the entire week.

"Don't worry, old man, you'll have plenty of company; those boys have been sitting down on us rather hard for the first week. I'll be out there with you on our first tour," was the sympathy voiced by another who was sitting on the bunk beside him.

"Say, fellows, what's all this about demerits, gigs and tours?" asked a new cadet who had come in about a half hour before and was trying to straighten out his bunk and find out about numerous questions concerning this new type of life he was just entering—possibly for a year, but probably for less.

"Say, Morrison, haven't you read your 'Cadet Orders' yet?" asked the corpulent Hayes, as he opened his face in his wide, characteristic grin. "You are getting into a real treat at

this place. Come here till I read some of the list of offenses for which demerits, commonly known as 'gigs,' are given."

Several others gathered around Hayes, and soon practically the entire bay was crowded around on the bunks close up to the speaker as he opened the Cadet Orders. Hayes started reading just a few from the four or five pages of offenses.

Awaiting the starting whistle for the famous Easter Egg Hunt.

"'Clothing improperly hung, three demerits; clothing not on proper hooks, two demerits; failure to stand at attention, four demerits; moving eyes while standing at attention, two demerits; shoes not shined, four demerits; shoes improperly shined, three demerits; shoes, under bed, not in line, two demerits; beds not lined straight, two demerits; lockers not locked, three demerits; bed improperly made, three demerits; hats not on pillow in the right place, books not in line, articles left on bed, dirt under bed, three demerits; books or paper on bed, three demerits; no name tag, two demerits; name tag not on straight, two demerits; late to any formation, three demerits; laughing in rank, three demerits; talking in rank, three demerits; raising hand in ranks without permission, two demerits; smoking outside of barracks, two demerits; failure to salute upper classmen, five demerits; failure to ask permission to speak, three demerits; uniform not properly pressed, three demerits; rifle not properly cleaned, three demerits;' and so on and so on."

"Say, Hayes, why don't you stop for breath. You sure are long-winded."

"Oh, is that you, Cocky Hales? Was I threatening your position?"

"Now, boys, remember the good book says we must not fight, and the cadet orders give fifty demerits for fighting," said Hilcut, another dodo who has read his Cadet Orders carefully.

The conversation was interrupted by a ringing of bells.

"Chow, boys; let's go," and the conversation ceased as if by magic and a hundred and ten hungry cadets quickly rushed out for dinner formation.

"Fall in!"

"Right dress!"

"Front!"

"Right face!"

"Forward—March!"

"Column right—March!"

The mob filed into mess hall on the most welcome of all formations.

This was one of the many series of formations that were a part of the daily routine of cadet life at Brooks Field, for the Dodo Days that lasted for the first month. The one hundred and ten cadets who had succeeded in securing appointments for the cadet school at Brooks Field were being initiated into the ways of the school and were indeed finding that there were many other things than flying to be done. Certain rules and regulations would have to be followed rather closely or else life might become unpleasant for them.

Anyone who had been a frosh at a college with strict upper classmen, and anyone with a good imagination plus a knowledge of military life can possibly visualize something of life at Brooks Field. It may have seemed a hardship to many of the boys there and a lot of unnecessary "bunk," but back of it all was a real purpose which it served well.

Young fellows, just out of college, can be likened to the average high school graduate who is just entering college. Many of them have an extravagant idea of their own importance and, so to speak, must be brought down a peg or two. Young men varying in age from 20 to 27, of all sizes and types; some quite reserved; others needing to go through the mill until a little more docile.

They were boys from practically every state except the Mountain and Pacific states—they were sent to March Field, at Riverside, California. With scarcely an exception they were all college men, having at least two years of college work, and a large percentage were graduates. Columbia, Illinois, Wisconsin, Pennsylvania, Penn State, Northwestern, Nebraska, Georgia Tech, Naval Academy, Military Academy, Texas, Michigan and a host of others too numerous to mention were all represented.

They were a cross section of the best youth of the country and, as far as health and intelligence were concerned, could not be surpassed. The physical examination, known as the famous "609," in army circles, is the most thorough and strict in existence. More than twelve hundred had reported to various Army Air Corps posts to undergo this examination. Two hundred were secured, the remaining thousand being found phys-

'Tenshun! an Upper Class-Cadet is just passing.

ically disqualified in this searching examination.

As a matter of fact, only a few over a hundred remained after the rechecking and were found to be fully qualified.

Although the first physical examination at the various posts are not really a part of cadet life, yet it is closely and vitally connected with a cadet's appointment, and it might be well to discuss this phase—not of cadet life but of possible cadet life.

After making the necessary application to the Adjutant General, War Department, Washington, D. C., the candidate is authorized to appear at the nearest Air Corps post for physical and mental examinations. However, if the proper credentials can be produced, showing that the holder has had at least two years' work at an institution of college rank (correspondence schools not being recognized by the Army) and that the two years of work have been successfully completed, he is automatically exempted from the mental tests. As a little piece of information, very few have ever passed the mental tests, a fact which shows the Army's decided preference for men with college training.

Those who have been exempted are then sorted out and are put through the "609" at the rate of six a day. That is the rate at which one group of 150 men were examined at Mitchel Field, Long Island. The physical test is quite thorough and takes about three hours. The eye test, the bane of all aviators and the despair of the would-be aviator, deserves more than passing mention. This is the part that prevents more than three-quarters of the candidates from qualifying. A man's eyes must be as nearly perfect as possible to meet the requirements of a good pilot. Such things as good depth perception, muscle balance, equality of vision in both eyes (for both eyes should be of practically the same strength), proper focusing and a host of other things are insisted upon, as a pilot's ability is largely dependent on his good judgment, and this is greatly influenced by his eyes. Just as "four out of five" have pyorrhea, so nine out of ten have deficient eyes.

At the hospital at Mitchel Field five men would be eagerly waiting in a nearby room when a crestfallen and dejected comrade would enter after having gone through the ordeal. Almost in one voice they would ask, "Did you pass?" even though they could almost invariably read the answer in his face, unless a forced smile skillfully hid his disappointment.

"No, darn it, no luck," said the despondent and disqualified subject of the flight surgeon's sentence.

"Tough luck, but you can try again," they would attempt to reassure him, while at the same time doubts were filling their own minds.

"Tough, I'll say it's tough. Do you know, this ruins all my plans? I've been concentrating all my energies on getting into Brooks Field and preparing for an aeronautical career. Now all my plans are shot as high as Mount Everest."

The scene shifts again to the sunny south, where up to March 1st about one hundred cadets had already arrived and were just getting into the general scheme of things. A good many of the boys were late because of last minute qualifying, and I was among them, arriving March 2, just one day late.

"What's your name, Mister, and where's your authorization to appear at this school?" asked a model looking cadet who, I afterwards learned, was the master Dodo and was a holdover from the previous class.

I gave him the necessary information, standing and talking in my usual manner.

"Stand at attention, Mister!"

I snapped to, instantly, and from then on I realized the force of that well known song, "You're in the Army Now."

"Here's your name tag, which you will wear at all times. This is your serial number, which you will memorize. Here are your Cadet Orders, which you will read at your first opportunity and with which you will familiarize yourself. You will be required not only to know them but to follow them to the letter. These orders will be in force for one month, and if at the end of that time the class has proved worthy the upper class will recognize you. Follow me and draw your equipment."

The famous "400"—the next ride is on a train for Home!

All this in a way that did not encourage the asking of any questions. I was taken over to the Supply Officer and was given my equipment. Later I was taken to the Quartermaster Depot to draw my clothing. The master Dodo had directed me to the barracks and told me to take a bunk at the upper end.

Taking him at his word, I started toward the upper end, but went just one bay too far. Walking up through the aisle, between bunks on all sides and looking for a vacant one, I was met by a more or less rude reception.

"Say, you Dodo! What are you doing up here?"

"Looking for a bunk."

"Don't you know this is an upper class bay and you're not allowed in here? Get out and stay out! Don't let us catch you in here again!"

The tones were quite impressive and I lost no time in doing his bidding and in the next bay below I found a vacant bunk among the new cadets. By this time the rush of

events had overwhelmed me and made me dizzy.

"Another one" was the only comment from my comrades, as they were quite accustomed to seeing new cadets dribbling in for the past two weeks.

Through the fog (not in flying) I suddenly realized that the mattress cover, sheets, blankets and the rest might have some place on the bunk—especially if I were to sleep there that night—and I did expect to stay for a few days at least. Another cadet who had a bunk across from me kindly volunteered to assist, and after a time I understood all the intricacies of making a bed and folding blankets so the whole would pass inspection.

"Did you draw your uniforms?" he asked.

No, not going anywhere—Just a Dodo posing for a snap.

"Oh, yes; here they are."

"I'll show you how they are to be hung. Your uniforms face the orderly room on the first two hooks, with hooks pointing inward; your shirts on the next hook; then your overalls; your sweater; your "civies," covered with paper bags; your raincoat; your barracks bag; and your towels. All your toilet articles on the shelf above, according to size. This may not be exactly right, but you'll learn what's wrong during inspection tomorrow. Remember that everything has its place, and even the things in your foot locker have their particular place."

Having made this much progress in such a short time I ventured outside the barracks to draw the remainder of my equipment after having put on my dodo uniform. This consisted of G. I. (Government Issue) shoes, coveralls and an overseas cap.

"Wait a minute," another dodo shouted as I walked down through the aisle. "Your belt should not be hanging out, but should be doubled over before being brought through the buckle. Also, you had better pin your cap together at the top. Maybe this will save you some gigs."

I thanked him for the tip and was proceeding on my way towards the Quartermaster's Depot when I heard someone call:

"Mister, come here!"

I turned around and faced an upper classman, whom I had not recognized as such, although he was attired in a regular cadet uniform.

"Why didn't you salute, Mister? What's your name?" He looked at my name tag, upon which my name was inscribed.

"I am very sorry, sir, but I just came in and haven't had time to read the Cadet Orders."

He softened and smiled, as if to say, "Oh, well, poor fellow, I'll let him go this time; he has lots more coming to him." "All right," he said, still wearing the same smile, "but read them at your first opportunity."

I saluted and did a right-about-face and continued on my way that much wiser by the encounter. In order that I would not commit too many of these blunders I glanced over the small pamphlet of Cadet Orders. I read: "Lower classmen shall salute all upper classmen outside the barracks" and "Lower classmen wishing information or wishing to address any upper classmen shall come to attention, salute and ask, 'May I speak, sir?' and if given permission may then speak."

I was told that all my uniforms had to have the cadet insignia sewed on, and I was on my way to their tailor shop. Not sure just where it was, I stopped an upper classman and saluted.

"May I speak, sir?"

"Yes."

"Where is the Post Exchange Tailor Shop?"

"Straight down this road, but you are not allowed on the front road, so you must go down the back walk."

I saluted, did my right about and proceeded. About half an hour later I had "chow" for the first time in the Army. I had the further opportunity of learning more of the regulations.

We were marched into the mess hall from formation, and at the command of "Seats" everyone took his place. There was positively no talking at the table—all dishes were passed to the upper classmen first. After finishing the meal we filed out and had to double time to the barracks.

But no rest for the weary.

"Say, fellows, what's that bell for?" asked one of the dodos. "There's nothing scheduled for this time."

"Dodos, all out, for outside police formation," shouted the master Dodo as he marched quickly down through the bays. Out rushed the dodos as if a fire alarm had been sounded.

"Fall in!"

"Company 'tenshun!"

"Count off!"

The orders were given in rapid succession.

"First platoon take these rakes and brooms and clean up the road. Second platoon pick up all paper, matchsticks and stones on the road and yard. Snap to it, dodos!"

That section was a scene of unusual activity, and after the road was swept and reswept it looked quite clean. A fellow could get quite a kick out of picking up a match here, walking ten feet to again bend down and pick up a piece of paper, repeat-

(*Continued on page* 79)

The New Croydon Port

A view of the signalling tower showing the electric device by which the operator signals the planes.

NEARLY four hundred acres are covered by the reconstructed Croydon Aerodrome, near London, England. This great airport of England's capital has recently been completed and was dedicated by Sir Samuel Hoare, the British Air Secretary. More than a million dollars were spent in reconstruction and improvement with the intention of making it one of the most complete airports in the world.

Besides housing the administrative offices of the Air Ministry—for Great Britain has a separate air ministry—the Croydon Aerodrome provides all the facilities required by the British and foreign air transport companies that make use of the port. These facilities include all of those normally provided by any passenger terminal but include special ones that are worthy of notice and consideration by transport agencies in this country.

For example, a hotel of 50 rooms, most of them with bath, is provided for the use of passengers arriving late at night or departing early in the morning. This accommodation for passengers serves to offset one disadvantage of air travel as at present constituted—the distance of airports from the cities they serve. The passenger arriving too late to make connection with an outgoing plane is not now compelled to make a long trip to the city and back again in time for the next sailing.

One thing we are willing to admit — that England has far outstripped us in the construction of this great airport, with its centralized dispatching system and radio apparatus. What great American city will be the first to have such an airport?

Enormous hangars are provided for the ships of the leasing companies. These buildings are 300 feet long, 150 feet deep, and have 30-foot sliding doors. Together, the various hangars can accommodate 35 of the largest passenger airplanes in use today. Behind the hangars are workshops and repair sheds of the latest type, furnished with modern equipment.

A larger area for landing and take-off has been provided and all the administrate offices have been centralized. The control of traffic has also been centralized and the aerodrome now operates its own weather bureau for the use of the companies using the facilities of Croydon.

A control tower, from which all planes are dispatched, houses a meteorologic office. It rises 80 feet above the main building. Here the weather forecasts are mapped, pilots

Pilots being informed of weather conditions on their routes by the officer in charge.

instructed as to weather conditions on their routes, and reports received from pilots in the air as to conditions they are encountering. An assistant officer receives the reports, charts them, and keeps pilots in the air informed as to conditions they may expect. On the speed and accuracy of this officer depends safety of the many liners leaving this port.

Pilots are in constant touch with the offices at Croydon, by means of radio telephone. Pilots are routed from the dispatcher's office in accordance with information at hand, and if conditions make it advisable that a change of course be adopted in order to avoid bad weather, the radio immediately places the pilot and the dispatcher into communication with each other.

A pilot ready to leave the port consults with the chief of the weather bureau and the map covering his course is inspected in order to determine weather conditions and the best course to take. When the plane is ready to take off the departure signal is given from the central control tower. On clear days it can be given by hand signal, but at night and when visibility is poor, an electric flashing device is used.

Once in the air the pilot keeps the home station informed as to his whereabouts and reports weather conditions en route. The receiving officers keep track of the positions of the various ships and a cartographer indicates their positions on a map, which forms a definite record of the position of all ships in the air.

The communicating apparatus is of the latest type and is so arranged that both telephony and telegraphy, on different wave lengths, can be received on the same aerials. The wireless station is new, and houses a group of four three-kilowatt transmitters, capable of continuous telephonic wave, or interrupted wave transmission, with a wave length range of 800 to 2,000 meters.

Should reports coming to the weather office indicate the presence of a storm, for instance, and the advisability of a change of route for certain liners in the storm area, it is a simple matter for the officer in charge to map a safer course and transmit his instructions to the pilots in the air.

It must be remembered that the continent represents a different problem in reference to flying weather than the United States, viewed as a whole. In the United States there is but one weather bureau, all sections of the country reporting together to central bureaus. In Europe it is necessary to collate information collected by many different countries. Flights are more often interrupted by adverse weather conditions, and fog is much more prevalent.

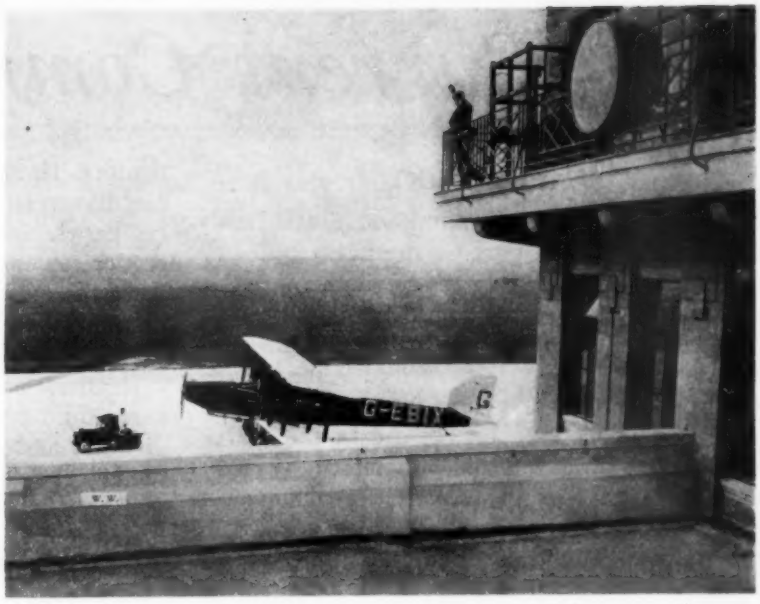
Direction finding devices have been carried farther in use than anywhere else. If a pilot loses his way in the fog he can obtain his position with little trouble. By sending out a request for his position to the control office, a definite procedure soon establishes his location. He is instructed to send out his signal by radio for a certain period of time.

The operator at the right discovers location of plane by direction finding apparatus and informs the cartographer in the next room.

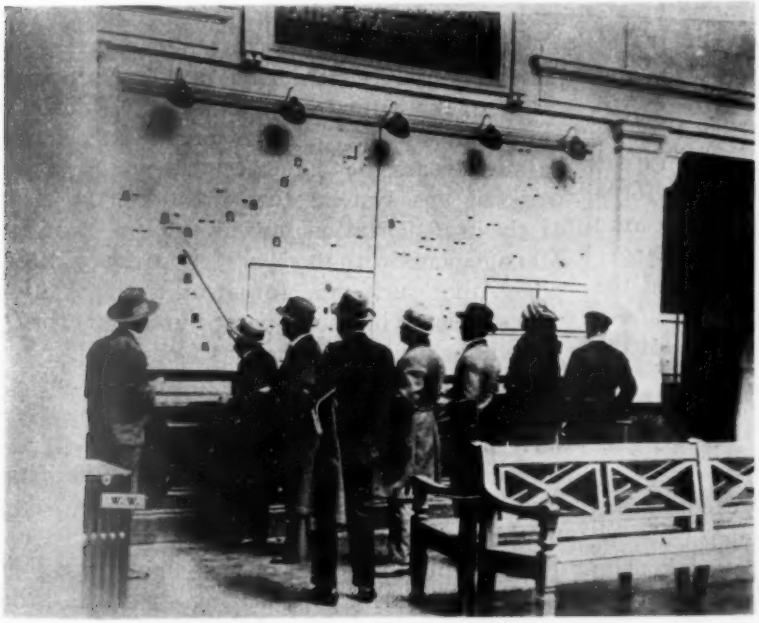
By means of direction finding apparatus the control tower locates the direction from which the signal comes. Other stations, located many miles from Croydon are requested to use their direction finding apparatus to locate the signal direction also. The moment two stations report the compass direction from which the signals are coming it is a matter of a moment's work on a map to extend the direction lines until they meet, thus locating the plane. Once the plane's location is established direction can be given the pilot as to the course to be followed.

Passengers are provided with waiting rooms and accommodations much the same as in modern railway stations. Large wall maps show the various courses and the routes, and weather conditions in the cities and ports are posted on the maps for the information of the flying public. Arrival and departure indicators, using clock faces, give the traveller the necessary information about the many different ships using the port. One beacon of three-quarters of a million candlepower, has been installed, and, it is claimed, can be seen for nearly fifty miles.

Air travel is not quite the commonplace in Europe that Americans are led to believe, but the fact remains that the accommodations offered are utilized to such an extent that it is good business, and excellent national policy, to provide more and better accommodations with the increase in business. So far patronage has justified the investment from a standpoint of expected future business. The establishment of similar ports in the United States, with the same facilities and special equipment would go far towards building up a clientele of users of air transportation.



Signalling one of the air liners to start.



On this large map are hung cards with the weather news from every aerodrome.

Canadian Aviation League

Complete independence of Canadian aircraft industries within the next 25 years from all outside aid is sponsored by the Aviation League of Canada definitely established at a meeting of delegates of all branches of the League at Ottawa recently.

Educational element in aviation was also stressed at the meeting. Approval was given university work which would enable students to prepare for aviation as a career upon leaving college. The aims and objects of the League, as adopted, were:

To insure the fullest development of civil and commercial aeronautics and to encourage the establishment of the aircraft manufacturing industry in Canada; to encourage research, experiment and education in the science of aviation; to support the provision and maintenance of an air force adequate to meet the requirements of defense; and to secure Canadian and other British interests in aviation.

Headquarters of the League are at Ottawa and membership fees are understood to be as follows: Founders, $1,000 and up; life members, patron $500, fellow $250, member $200; annual memberships, patron $50, fellow $25, supporting member $10, contributing member $5, and member $200.

Current Comment

Repetition

We commented last month on the chivalry that seems to be a part of the nature of men who breathe the rarer air of flight, and no sooner was the comment in print than we read of the volunteering of experienced pilots such as Eielson, courageous men like Wilkins, and others not so well known to fame and the front pages of the newspapers, to aid in the search for the lost Italia, marooned somewhere in the desolate wastes of the Arctic. Few know the difficulties attached to a volunteer service of this nature, but those who do, unite in the salute to these men who are men and brothers of the air.

Nobody's Business

Our two greatest cities are still without convenient air ports. Both have projects in view, but progress on them seems to be lost in the maze of politics that surrounds the activities of large communities. Chicago and New York have air ports, it is true, but they are located an hour's ride from the centers of activity. This is the air equivalent of a hundred miles. Practically it works out that it does not pay to take an air trip to either one of these cities from a lesser distance than two hundred, or two hundred and fifty miles. This is a definite limitation of air traffic, and a handicap that the transport companies can do nothing to overcome.

Smaller cities have come to the front in a surprising manner. Ports have been built, lighted and equipped, and are in use in hundreds of our small cities and towns. Possibly the force of public opinion is felt sooner by the powers that be in the smaller centers. Will the larger cities be penalized for their laxity? Read the list of stops on the new Transcontinental line—Columbus, St. Louis, Wichita, Nogales—for the answer.

Here's Money

One of the trials of the average editor has been spared those in charge of the destinies of Popular Aviation. Most editors are kept in the dark as to the likes and dislikes of their readers. The average man is quite content to let his disagreement take the form of "stopping his paper." The poor editor who has lost a reader never knows why; and he never hears from the man who agrees with his selection of reading matter, because that man's approval is expressed by his continuing as a reader.

Readers of Popular Aviation have been more than generous in writing their likes and dislikes, and to their kindly comments can go the credit for the rapidly increasing circulation of Popular Aviation. It has been modeled on their expressed desires and their criticisms. And as they have had a share in the building of Popular Aviation into the magazine of greatest circulation in the aeronautical field, they should have something more than just our thanks.

So, from now on, whenever an idea, comment, suggestion or criticism comes to us from one of our readers, and we feel that it offers us something constructive in the monthly business of interesting over a hundred thousand readers, we are going to send a check to show our appreciation.

A Long Step Forward

The announcement of the formation of the Transcontinental Air Transport ushers in the beginning of a new era in transportation. The interesting of powerful financial groups such as the railroads in air transport is simply an indication of the future of travel by air. Railroads are noted for their conservatism, and in the past few years they have seen the rise of a network of bus systems that are taking a share of the transportation business of the country. Managements with modern ideas are now determined that such new forms of transportation that develop will not be passed up by the roads, but will be utilized by them as feeders.

There are no greater difficulties to be met in the development and operation of air lines than have been conquered in the past century, from the time the Baltimore & Ohio was built as our first common carrier down to the present day, by the great railways of the country.

One thing the new transport company will do—it will go far in popularizing air travel. One

Current Comment

of the present difficulties of night air travel—the matter of comfort in sleeping—is at once obviated by the plan of using the railroads for the night hauls, and the planes for day travel. For the present the difficulty is simply one of expediency, for it is perfectly possible to build air liners with comfortable berths, to motor them with sufficiently powerful motors, and to operate them. However, traffic does not warrant it, and air transport has not yet reached the stage that would warrant such accommodations for the traveler. But—be warned, do not be taking any wagers against the possibility of such a service within a comparatively short time.

The new service will operate between the coasts, and will automatically pick up the great portion of the emergency traffic. Nothing will go so far toward popularizing air travel as a nucleus of passengers who regularly take the transcontinental trip. You can't keep a man from talking about his air trip from coast to coast. Look at Will Rogers—and more power to him.

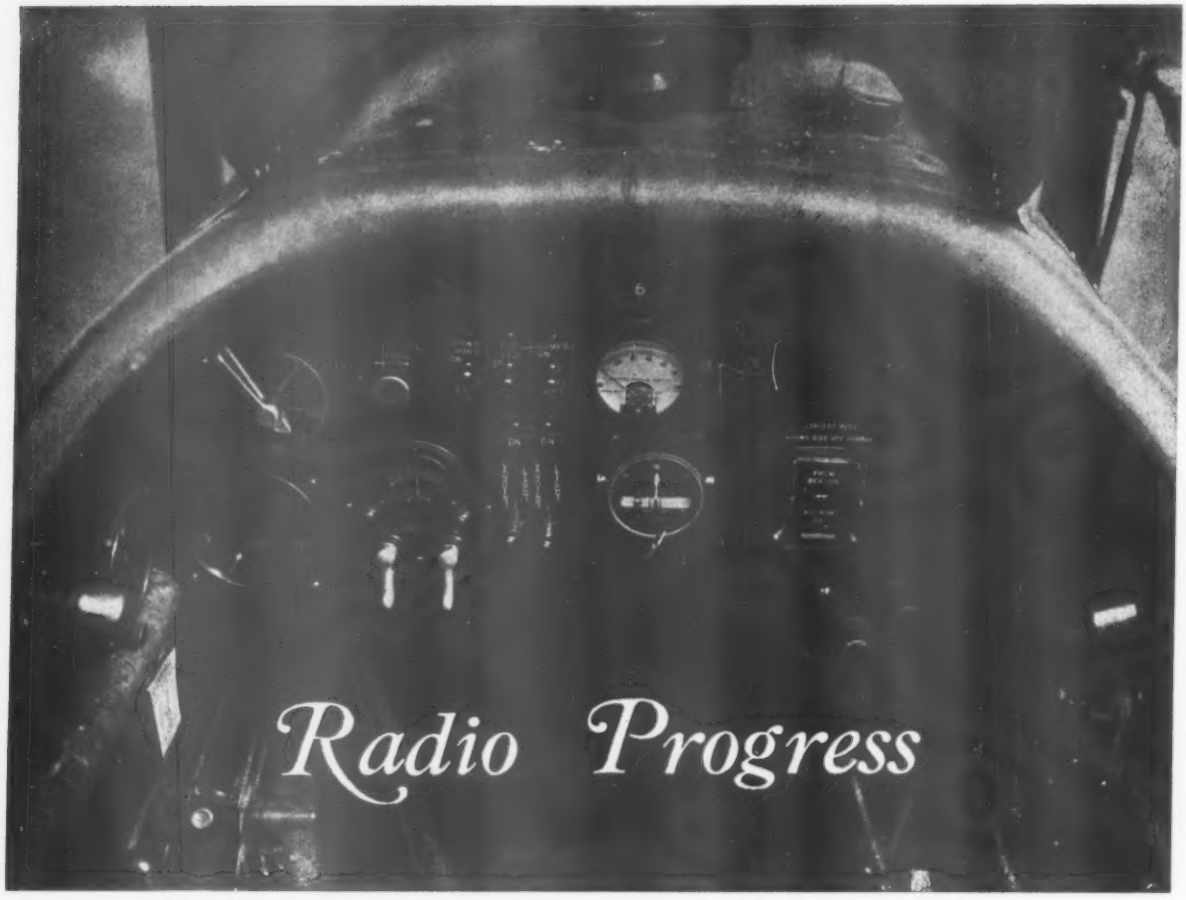
The School Question

The rush of applicants for aviation training that has characterized the last twelve months has accomplished one thing in a brief space of time. It has brought into being scores of aviation schools, all of which lay more or less emphasis on the opportunity which exists in aviation. This opportunity does exist, and it is not at all unlikely that air transport will increase to such an extent that a shortage of trained men will exist. With the scores of reputable schools, which endeavor to give, and succeed in a large majority of cases, a thorough training commensurate with the sum paid for it, came a flood of so-called schools, large in promises and small in equipment and effort. Fortunately they are dying fast, these disreputable agencies for separating the youth and his money. The pilot and mechanic prospect is so enthusiastic over his chosen career that he reads everything on the subject that he can secure. Within a short time he has so educated himself by reading and observation that he automatically has taken himself out of the range of the sharpshooters. Today he cannot be fooled on equipment and a real course has to be offered him to secure his enrollment fee. The situation that called forth dire shakings of the head at Washington last December shows signs of clearing up from within. Meanwhile the best of the schools are prospering, purchasing more and more flying equipment and turning out better and better students. There remains only the problem of supplying these men with planes so they can get in their hours for license requirements. That, too, will probably be cleared up shortly. It is characteristic of our life to meet demand with supply.

And As for the Women

Has anyone ever attempted to measure the interest of the fair sex in aviation? We know that a cross section of the young people of the country will show something more than interest in aviation. Ask any boy if he would like a ride in an airplane. You know the answer beforehand. But how about the young girl, and the young lady? Have they the same enthusiasm? The question is more than academic. Automobile sales agencies will tell you the influence women have in the purchase of an automobile. For several years a portion of the sales appeal of the auto trade has been directed at the women. Now, with the two car sales idea gaining strength, a direct and separate appeal is being made to women. Look at much of the automobile advertising copy and you will see the trend of their advertising.

Are women to have as great, or greater influence in the sale of airplanes, when the distribution of planes becomes a commonplace of business? Are men today prevented from purchasing planes for transportation or for sport because of feminine fears? Will it take time for an educational campaign directed at the women to eliminate this factor that may militate against the popularizing of the airplane? It has been said that any fool can ask questions, and the above numerous interrogations might be classed with that type of purposeless query; but there is a germ of thought in all that chaff of question marks, and it might be worth the winnowing.



Radio Progress

By S. R. Winters

THE elimination of head telephones and the trailing-wire antenna, as radio equipment on aircraft, is possible by means of novel arrangements devised by the Radio Laboratory of the Bureau of Standards. A visual device marks an unerring path for the pilot, obviating the necessity of a head set for intercepting radio signals. A short vertical rod as an antenna displaces the conventional dangling wire, which frequently lashes itself to pieces and is a constant source of trouble to the pilot.

Drawing chalk lines, as it were, on the instrument board of an airplane, two vibrating reeds indicate to the pilot whether he is safely on his course or deviating to the right or left. This new instrument dispenses with head telephones or the aural system and makes it possible for aviators to receive directive radio signals visually. Pilots scorn the practice of wearing headsets, and the visual indicator obviates this, merely necessitating an occasional glance at the airplane instrument board.

A directive radio beacon, to be ordinarily established at airports 200 miles apart, when sending out modulated signals at two low frequencies, actuates this reed indicator, which is plugged into the head-telephone jack of the airplane receiving set instead of the telephones. If the airplane deviates to one side of the course, the intensity of one of these modulated waves increases and the other decreases—owing to the directive characteristic of the two large coil antennas at the transmitting beacon station.

The two vibrating steel reeds have white tips and the indicator functions much like a telephone receiver, except it is tuned to two frequencies—say, 65 and 85 cycles. The beacon signals, which are continuously sent from the two crossed loop antennas at the transmitting station, cause these two reeds to vibrate. The tips are purposely white, with a dark background, so that when vibrating they seem to sketch a vertical white line.

The reed to the left of the pilot is tuned to a frequency of 85 cycles and the one to his right is in resonance with 65 cycles. These two lines, alone, require the attention of the aviator for his safe guidance in fog, darkness or low visibility. If the two white lines are equal in length, the pilot is on his correct course. If, however, the one on his right becomes longer than the other, the airplane has drifted off the appointed course to the right (into the region where there is more of the 65 cycles). If the airplane swerves off the course to the left, the white line on the left becomes longer.

The visual indicator proper, which consists of a set of coils through which pass the audio output current of the airplane receiving set, can also be employed to send messages to the pilot. It is only necessary to interrupt the transmitting current at a

slow rate in accordance with a code understood by the pilot. Additional vibrating reeds, in resonance with other frequencies, can be used to transmit special information. The audio-frequency tuning of the reed vibrators aids in the avoidance of interference between the directive transmitting radio beacons. When one beacon station uses modulating frequencies of 65 and 85, the next station can use 75 and 95 cycles, etc. Several pairs of vibrating reeds may be installed conveniently on the instrument board of an airplane.

The trailing-wire antenna, with its "fish" or lead weight, may be discarded as a radio pickup system on aircraft. The tendency to whip itself to pieces, the trouble involved in reeling in and out the wire, and the disposition to defeat low flying are among the objectionable factors which have doomed its period of usefulness.

A 10-foot metal rod, mounted erect in the airplane, is destined to displace the trailing wire, which has been used invariably since radio communication was established on aircraft. The introduction of directive beacons, marker beacons and visual indicators for guiding aircraft by radio has hastened the departure of the trailing wire. For the latter is not only troublesome, but, when employed in the reception of directive or beam radio, errors and deviations are introduced in guiding airplanes.

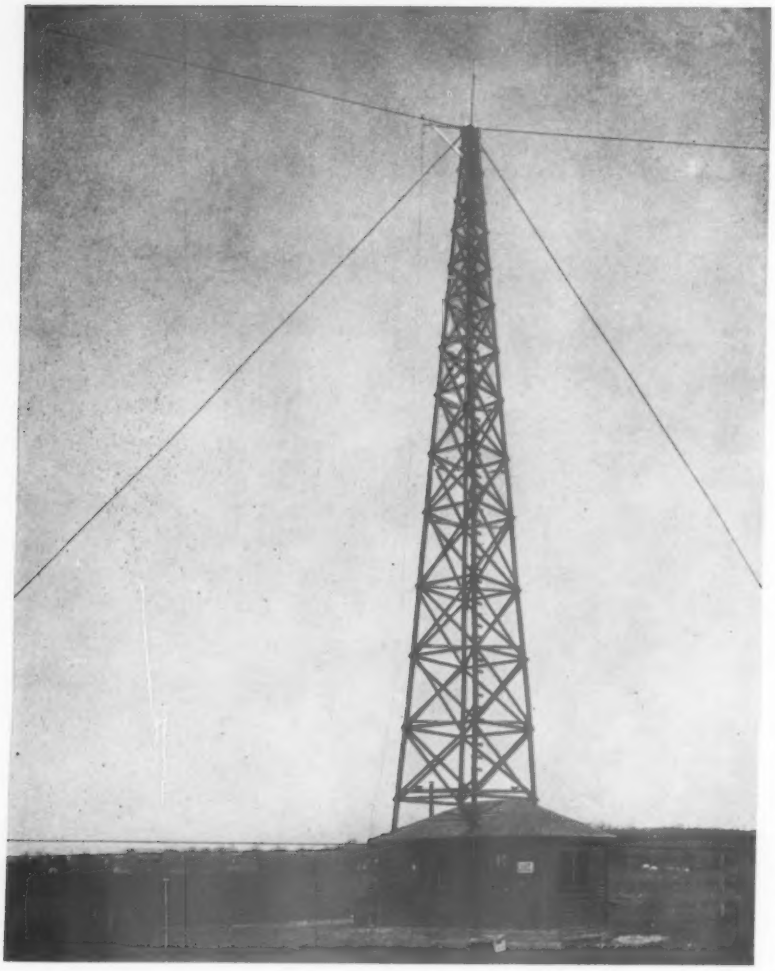
The trailing wire is to be eliminated at a sacrifice of distance range, but the designing of an extremely sensitive radio receiving set will, it is believed, make of the 10-foot metal rod a practical and efficient pickup system. This short antenna extends vertically from the cockpit, and it is said to be especially adapted to the purpose of locating signals from a radio beacon station. Little difficulty has been experienced in locating the beacon station within a distance of 200 feet when flying at altitudes up to 1,000 feet.

Dr. J. H. Dellinger explaining device to W. P. MacCracken. Note rod aerial.

The efficiency of this 10-foot antenna, however, depends largely upon the sensitivity of a radio receiver designed by the Radio Laboratory of the Bureau of Standards. The miniature 6-tube receiver weighs only 15 pounds, with an additionally imposed 15 pounds for the necessary 6-volt battery as the power supply. The receiving set operates in the frequency range from 285 to 350 kilocycles, and reception is not limited to the beacon signals, but radio telephone and telegraph messages may be intercepted as well.

Three-volt vacuum tubes are employed, selected for freedom from microphonic noises. The receiver may be remotely controlled both in tuning and varying the volume, thus rendering it feasible to install the outfit in the tail of an airplane. The set is doubly shielded—interstage

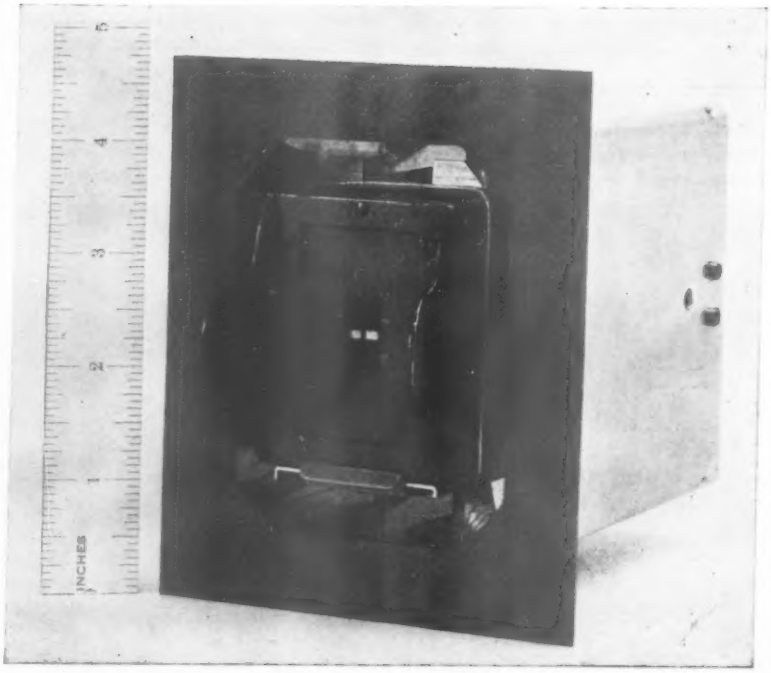
Radio apparatus used for transmitting direction beacon for the visual indicator.



The directional beacon tower at College Park, Maryland.

shielding as well as shielding against extraneous interference. "Selective and sensitive" are the terms used by the Bureau of Standards in introducing this new airplane radio receiver.

This outfit, together with the 10-foot metal pole as an antenna, has already been installed on experimental airplanes of the Bureau of Standards. During May six commercial airplanes will be similarly equipped. Meanwhile tests are in progress at College Park, Maryland, to determine what degree of engine ignition shielding is necessary in airplanes using this radio receiver and other equipment intended for the safe guidance of aircraft in fog and other adverse weather conditions.



Close-up of visual indicator which eliminates head phones in direction finding.

"This development," declares Dr. J. H. Dellinger, Chief of the Radio Laboratory of the Bureau of Standards, "insures the full success of the Department of Commerce program of aids to air navigation. It is the intention of the department to establish radio telephone and radio beacon stations along the civil airways throughout the country, probably at the principal airports. To utilize both services, airplane operating companies will only have to provide a moderate amount of engine ignition shielding and to install a very simple radio receiving set on each of their airplanes."

Unique Flying Service

Walter H. Reamer, tor some months past successfully operating a commercial airplane service from the Sand Point airdrome, near Seattle, has departed for the far north where he will inaugurate a unique flying service. He will be employed by the Baranof Mildcure Company, and his duties will be to "spot" salmon schools from an airplane cockpit and send down their location to the men in the fishing vessels.

He expects to keep fairly busy in this occupation during the summer months, and be in the air for the bulk of the time as sometime tance apart.

This Man Might Well Be You!

A few weeks ago Pilot McDonald worked in a small town without much chance of really getting anywhere. Today, after taking the C. A. C. aviation course and backed by our Welfare Department, he has a position in the World's greatest and newest industry, aviation. Read what pilot McDonald says in his letter at the right. Just as a story of success, this is interesting. But to you it has a greater significance.—**This man might well be you.**

There is no need to tell you that aviation is the world's newest and greatest industry. There is no need to tell you of the big success men are making today in aviation. The fact that you are reading this magazine shows that you know this. Why are you not making steps right now to get in while it is still young? Are you willing to sit idly by and see others take places in this field that should belong to you?

Stop wishing about aviation. Take some action. Decide for yourself now whether you do or do not want to get into this field. If you do not let that end the matter. If you do, we will help you.

Chief Pilot Bassett has written a big book on aviation—we are willing to send you a copy free to help you get started.

Read Pilot McDonald's Letter

"Due to the fact that I am about to complete my flying test, I feel that this is the opportune time to express my sincere appreciation of your wonderful School and the help it has been to me in securing the position I now have at the Municipal Airport.

"Your patience and skill during my instruction has made me very competent and able to hold the job and to be fitted for the opportunities there are here in the way of promotion.

"I shall certainly be delighted to recommend your School to anyone interested in Aviation and I hope that they will have the good luck of getting their instruction under such capable and experienced instructors as are connected with the Chicago School of Aviation. Wishing you success, I am

Very truly yours,
W. H. McDONALD.

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Pioneer Air Pilots

John B. Moisant

The pioneer pilot, Moisant, standing next a Bleriot plane with which he accomplished many of his feats.

By Albert Buranelli

ON Saturday, October 8th, 1910, the La Savoie, a crack French liner, steamed slowly past the Statue of Liberty on the way to its pier. A prophet of a new era walked her decks, and spoke convincingly of all-metal airplanes flying at speeds of two hundred miles an hour or better and trans-Atlantic flights.

The man who spoke so matter-of-factly of those improbabilities, if not impossibilities, of 1910 had soared into the limelight several months previously by flying from Paris to London with a passenger—two passengers if a kitten is to be counted—thus opening a way for the tourists of today who desire to evade that bane of the Channel crossing—seasickness. He was returning to the United States to take part in the coming International Aviation Meet at Belmont Park. To the reporters who used the French idiom in pronouncing his name he protested good-naturedly.

"My name is Moisant! John B. Moisant, of Chicago. I don't want to be called 'Moisang.' Of course they called me that abroad, the French can't help it. But I am at home now."

His mid-western diction amply attested his origin; but a sun-darkened complexion, coupled with his name, often caused him to be taken for a Spaniard or a Frenchman. He had the build that is ideal for an aviator: short, compact and light. Lack of nervousness, he often pointed out, was a prime requisite in a flyer's make-up, and he possessed it to a high degree. Besides he was jolly, responsive and unaffected; an excellent companion.

Of French-Canadian parentage Moisant was born at Manteno, Illinois—a suburb of Chicago—on April 25th, 1873. He was second eldest in a family of six. The elder Moisant, or Moissant as the name was also spelled, was a baker. In 1889 he moved his family to the Brighton Park district of Chicago, and opened a pastry shop. The youngster attended high school there and, in his spare time, helped in the bakery. It was unsuccessful; and during this critical period in the family fortunes death came upon them. With the death of the father, Moisant borrowed enough money from an uncle to carry his brothers and sisters west. That was in 1892. They settled in Alameda, California, across the bay from San Francisco.

At this time, the miniature countries of Central America were working toward the formation of a grand nation that was to be known as "The United States of Central America." In the hub-bub attendant on that momentous undertaking conditions in the participating countries were in a highly unsettled state. Moisant and his brothers were quick to recognize the opportunities that the situation offered. In 1893 with Alfred, his elder brother, Moisant went to Salvador.

That was the beginning of a period that was to make the name of "Johnny" Moisant somewhat of a legend in the land of "opera bouffe" revolutions. George P. Putnam, in

Commercial Aviation's Largest Single-Order Fly-Away Delivery

The largest single fly-away order of commercial airplanes in the history of the industry left the Swallow field at Wichita on Thursday, May 17th. Williams & Shoblaska, of Manitowoc, Swallow Distributors for the State of Wisconsin, came to Wichita with four of their pilots to take delivery on these six Standard Swallow planes.

So far as we have been able to learn, this is the largest number of commercial planes ever taken by one dealer in America, for fly-away delivery. Surely it is a tremendous testimonial to the popularity of the Swallow—America's Pioneer Commercial Airplane—as well as to the exceptional profit making possibilities of the Swallow dealer's franchise.

A few good territories are still open. If you are thinking of entering this most fascinating and highly profitable business, write or wire us today for full particulars.

VICTOR H. ROOS, Gen'l Mgr.

SWALLOW AIRPLANE CO.

WICHITA, KANSAS

"The Southland of North America," commented:

"Salvador is supremely proud of two things. The first is its prosperity. The second is that "Johnny" Moisant, the aviator who was killed at New Orleans a couple of years ago, once lived in Salvador. The reflected fame of the Moisant residence will never be cast off the little country's shoulders."

On their arrival the Moisants acquired an undeveloped coffee plantation. George, the other brother joined them in a partnership. They prospered.

Lindbergh was not the only flyer who had a kitten.

In November, 1898, the attempt to form a united nation failed through the machination of Tomas Regalado, a Salvadoran general, who led a separatist movement. His grateful country elected him President. That did not satisfy "Johnny," and he conceived a plan for his overthrow. The authorities got wind of the plot. They confiscated the property of the Moisants and, in an effort to get incriminating evidence, caused the plantation laborers to be hung by the thumbs. "Johnny" fled to Honduras, and filed a claim with the State Department at Washington against the government of Salvador. Mr. Merry, American Minister to Costa Rica, was sent to settle the matter.

Manuel Bonilla was the President of Honduras and, soon after his arrival, Moisant learned that General Davila wanted the job. He got in touch with ex-President Policarpo Bonilla who was backing Davila. Through him Moisant contributed forty thousand dollars to the cause, with the understanding that if the revolution were successful he was to have a concession for a government bank at Tegucigalpa. The movement was successful, the new Congress passed a law granting the concession, but Davila repudiated the deal made by his confrere. Moisant again turned to the State Department in his trouble.

The Moisants were now the owners of two large ranchos—the Santa Emelia and Santa Ana—in Salvador, operated three banks and had possessions in Mexico, Honduras and Nicaragua. In the latter country, where "Johnny" was sojourning in 1907, President Zelaya was plotting a revolution in Salvador. In April Alfred and George Moisant were arrested and imprisoned by order of President Figueroa of Salvador, charged with aiding and abetting the revolutionists and with hiding the revolutionary General, Escalon.

Zelaya commissioned "Johnny" a Colonel and placed him in command of an expedition of Salvadoran malcontents on the Nicaraguan gunboat Mombotombo. "Colonel" Moisant coolly handled a machine gun during the attack on the port of Acajutla. After its capture they marched on Sansonate where they borrowed twenty-five thousand dollars—some accounts say two hundred thousand—and, later, his troops becoming panic stricken, Moisant returned to Nicaragua. His brothers were released in July with the understanding that if they attempted to leave the country their property would be confiscated. In November "Johnny" returned to San Francisco on a visit.

In March, 1909, he joined Prudencio Alfaro in an attempt to overthrow his old enemy, President Figueroa. Commanding a conglomerate flotilla of small craft he sailed in April from Nicaragua. William S. Benson, U. S. N., commander of the cruiser Albany, stopped the expedition by threatening to blow them out of the water. In May he was summoned aboard the cruiser Colorado, then anchored off a Nicaraguan port, and warned he was sacrificing his right to protection as an American citizen.

Moisant, a comparatively wealthy man, decided to take a long rest. In August he sailed for France. At the Rheims meet he talked with Glenn Curtiss. He was impressed, and immediately began the design of a plane. By the end of September he had whipped a machine of sorts into shape. In November he tried his hand at flying it.

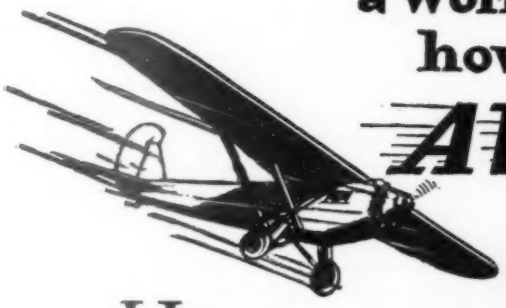
Fileux, his mechanic, said:

"He had risen almost ninety feet when the machine plunged and was wrecked. Moisant crawled out of the mass of canvass and wire unhurt. He carelessly stuffed his hands in his pockets and looked at the wreck. 'I had the fun of getting off the ground, anyhow. Didn't I?' he said. 'You should have tried out the machine on the ground first,' someone suggested. 'I am not driving automobiles,' he replied 'but am going up in flying machines.'"

That was Moisant. The 1909 flying season was over, and Moisant occupied himself with the design of an airplane to be made entirely of aluminum. In July, 1910, he bought a Bleriot—a fifty H. P. two seater.

In this FREE BOOK

a World-Famous Flier shows how *YOU* can get into AVIATION



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On his first flight in it he circled the aerodrome at Etampes three times. He wabbled a bit, but made a good landing. On July 30th, Bleriot superintended his trial flight for a pilot license. He passed the tests. His fourth flight was made from Etampes to Issy with a passenger. It was his first cross country trip, and he arrived in time to see the start of the Circuit of the East. His request to participate in the famous race was refused by the officials on the score that he was inexperienced. For the ordinary person that would have been sufficient; but Moisant was no ordinary person. They would not let him in the race; well he would do something more difficult. He began the "impossible" on his fifth flight. Let him tell it.

"I started from Paris last evening (August 16th) at 5:45 P. M. carrying my mechanic, who weighs 182 pounds. (He had never been off the ground before.) When we started from Paris he did not know where I was taking him. Some newspaper men asked me where I was off to. I said I was going to try my machine out and they would probably see me again later in the evening. I flew from Paris to Amiens, where I arrived at 7:30 o'clock last evening.

"I left Amiens at 5:10 o'clock this morning. When I got to Calais I flew over the town three times before I found ground at Les Barraques, where I landed.

"I left Calais at 10:45 o'clock this morning in a strong, gusty wind. People tried to dissuade me from going, but when I got over the Channel the wind was much lighter. I flew about seven hundred feet high and had a fairly steady time until I got over the land again. I though I was over Dover, but later I found it was Deal."

At this point his luck deserted him. A rainstorm came up and forced him to land. In making the remaining seventy miles of the two hundred and ninety-six mile journey he suffered nine mishaps, and it was not until the evening of September, 6th, that he arrived over London; he circled the Crystal Palace at 5:25 and then landed in a cricket field at Beckenham. The first to fly from Paris to London—the first to fly the Channel with a passenger. And with only four previous flights to his credit! "Impossible."

How did he do it? How did this tyro, who had never been north of Paris, find his way? It was simple as he explained it. He marked off his courses—Paris to Amiens, Amiens to Calais, Calais to Dover, etc.—on his map. Then with Fileux aboard he took off. At a thousand feet he swung his machine until the compass needle pointed him on his course; with a large object on the horizon as a guide he flew to that mark; that point reached he again swung onto a true compass course, and repeated until he reached his destination. At Amiens he met Bleriot and confided his object to him. As he was preparing to take off a feminine admirer presented him with a kitten. Thus was the third passenger taken aboard.

Have you some photographs of Old Timers? Popular Aviation will purchase them, or, if we cannot use them, return them to you in good condition. In case you wish the photograph back after we have finished with it, arrangements can be made for its return to you. Mark them plainly with your name and address and identify the subjects. Enclose return postage.

During the trip he slept beneath the wings of the plane. When he arrived at Upchurch, England, he was black from head to foot, his clothes were covered with dirt, his hair was matted with oil and his hands and face were covered with grease; a diamond ring and tiepin gave an incongruous touch to the whole. He was adamant to all suggestions that he go on to London by other means. His arrival there was the signal for a great ovation. The London Daily Mail presented him with a gold loving cup in commemoration of his achievement.

On October 1st, Moisant sailed from Havre to the United States with his brother Alfred. They took up quarters at the Astor Hotel where they were joined by their sisters, Louise and Mathilde.

Besides his Paris-London machine Moisant brought to this country a speedy single seater Bleriot. While trying it out on the afternoon of the 19th he lost control and fell two hundred feet. The machine was a total wreck; Moisant escaped with a shaking up.

"I don't know how I was saved," he said cheerfully. "I simply forgot to have my oil turned on, and when I was trying to do it my foot slipped from my control."

The International Cup race took place on the 29th. Flying in the place of Brookins, who had crashed at the beginning of the contest, Moisant took second place.

Thomas F. Ryan, the financier, had offered a ten thousand dollar prize to be competed for in a race around the Statue of Liberty and back. The race took place Sunday, October, 30th. Shortly after noon, Moisant, returning from a preliminary flight, ran into a Farman belonging to Grahame-White that had been left standing on the aerodrome. He was pitched to the ground, and a wing was torn from his plane.

On the previous day, during the International Cup race, Alfred Le Blanc had crashed. In his hangar was the wrecked machine and an unassembled Bleriot. He was not there; but Alfred Moisant got him on the phone at the Knickerbocker Hotel. An offer of fifty thousand francs for the machine providing it was ready for the race sent him rushing to the field. In the meantime his mechanics, spurred on by the offer of a bonus, set to work.

At 3:05 De Lesseps crossed the starting line; Grahame-White followed him three minutes later. Le Blanc arrived at the hangar at 3:30, and the elder Moisant handed him a check for ten thousand dollars. The work went on with renewed vigor. Grahame-White returned at 3:44. It was generally conceded that he was the winner, and the crowd gave him an ovation. He stood on the judges' platform before the reviewing stand, receiving a victor's acclamations, when the announcement came that Moisant was ready to start.

The official timer clocked 4:06:58 when he crossed the starting line. Where Grahame-White elected to take a circuitous route in order to avoid flying over the city Moisant flew in a beeline; circled the Statue at a height of 2,800 feet; and landed

(*Continued on page 76*)

Cessna Laps the Field

at the Kansas City Races

The only and real interesting event was the stellar performance of the new Cessna monoplane. Piloted by Francis "Chief" Bowhan, the Cessna plane left another monoplane and a [redacted] far in its wake. He had gained a full lap on his nearest competitor at the end. Bowhan flew a "mean" craft. Starting with a lurch, he leaped into the air, flying close to the ground and rounding the pylons in a steep bank. Flying the course four times, he ended at the checkered flag, shooting his Wright Whirlwind job straight up for a climb of a 1000 feet. William P. McCracken, government aviation chief, was one of the first to congratulate the winner, and complimented "Chief" on his masterful handling of the cantilever plane.

The Cessna's official time on the 6-mile triangular course in the 30-mile race at Kansas City was 157.2 miles per hour, taken from a standing start.

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Releasing "Chutes"

A PARACHUTE jumper, encumbered with straps, may drown when alighting on water. Or, when landing on the ground, imprisoned in parachute harness, an aviator may sustain injuries when dragged for some distance by a violent wind.

These hazards are lessened, if not eliminated, as the result of a novel parachute jumping practice instituted by the Air Corps of the United States Army. The aviator is taught the art of freeing himself from the parachute harness when descending on land or water.

In this new training service, the parachute descends slowly enough to afford the aviator ample time to disengage himself from the straps and other encumbrances. Upon nearing the water the aviator unbuckles the straps that pass between his legs, thereby freeing the lower part of his body. Straps over his shoulders and beneath his arms still offer support and avoid the peril of a too abrupt drop.

Not that it has anything to do with parachutes — but on page 71 you will find the announcement of the second contest Popular Aviation will run. A really first class wrist watch will be awarded for the best story in accordance with the conditions that you will find on page 71. Read the announcement now.

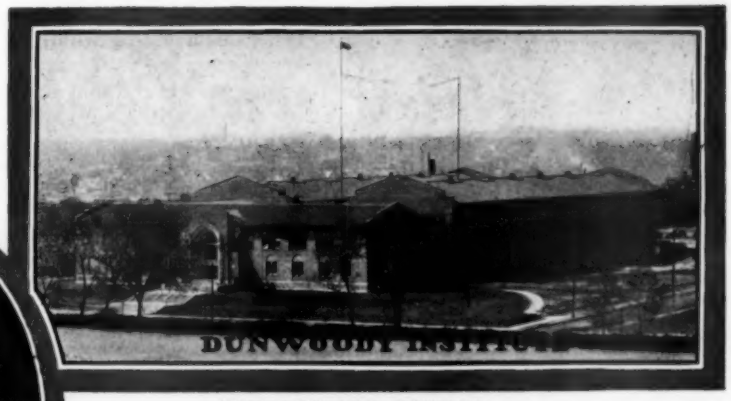
As the feet of the aviator are within reaching distance of the water, the parachute-jumper extends his arms straight above and thus disengages himself from the shoulder straps. This frees him from the harness and parachute altogether, and he is at liberty to swim for shore or boat. The parachute is lost unless recovered by someone else.

Government aviation services, mindful that parachute-jumping is no longer a "stunt" but a life-or-death necessity, are constantly designing new parachutes and devising novel ways of using these safety devices. One design forces an aviator from an airplane when distress overtakes him. This parachute is an emergency measure intended especially for flyers who courageously brave the dangers of the air when seated in an airplane but are loath to leap into space by the parachute route. And, even though the aviator tenaciously clings onto the strut, this new parachute jerks him into space at the proper moment.

This parachute, of course, precedes the aviator, being thrown off the airplane before the jumper leaves. Thus, in practical effect, the aviator is pulled off the flying machine. It is claimed that it is impossible for this parachute to get afoul of the plane, since it is at least ten yards away before it opens. It operates in this wise:

The aviator walks out on the wing

A MODERN FLYING SCHOOL



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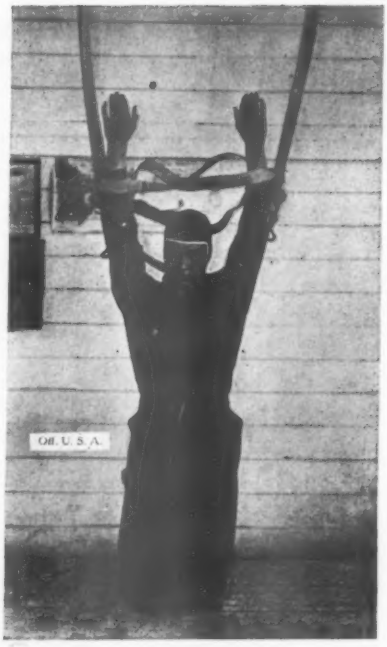
of the airplane, holding fast to a strut, and releases the safety device. The parachute is controlled by a small bag which emerges on the pulling of a rip cord to which a ring is attached. The pilot parachute opens automatically through the force of rubber springs. It drags the main bag into position and causes it to spread out and inflate. Then the aviator is dragged into space.

James K. Clark, a parachute jumper of the United States Navy Department, describes the sensation of using this novel parachute: "The jerk you get when your body is suddenly dragged off the wing of a plane going at a speed of, say, a hundred miles an hour, is a bit severe, but it doesn't hurt you. The first such departure from a plane is the hardest. When you step off backward into the great unknown it seems incredible to believe you will land safely, but land safely you do. The second jump isn't nearly as difficult to make."

Left—Normal Drop Position. Below—Raising arms frees him from shoulder straps.

Slow motion pictures have been made of this type of parachute in use, and invariably the parachute-jumper is shown holding fast to a strut rather than willingly taking the plunge with the new safety device. This tendency to stay with the plane rather than follow the adventuresome parachute is demonstrated by the nervy and experienced aviators as well as those possessing timidity for the lack of experience in parachute-jumping. This type of safety device is cold-blooded and ruthless, as it were, and the aviator in distress must leave the ship.

Left—Straps between legs unfastened. Arms together keep harness in place.



When water is reached pilot can free himself completely of the parachute.

From a standpoint of safety devices for the personnel of aircraft, the parachute has proven its worth. Although the early models were somewhat haphazard in construction and reliability, the ones of later design have shown a marked improvement in these factors. During the latter part of the war the question arose as to whether or not pilots should be equipped with parachutes. It was maintained that if equipment of this sort was provided the men would not fight to the utmost in combat. This attitude resulted in the deaths of many valuable men. Now, however, that their worth has been proven, all personnel of the army and navy air corps, as well as mail pilots are provided with them, and on glancing through the records of accidents it can be seen that had it not been for this foresight, we would have lost many men, whose later lives proved of the greatest value to aviation.

ANOTHER ACTOR IN THE AIR

FLYING is great, Fred Stone thinks. He loves it because it gives him freedom. No schedule. Go any place. Fly anywhere he likes—Chicago, Cleveland, Atlanta, maybe to New York over the week-end. It's as pleasant as being one of the theatre's greatest actors.

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Some Motorless Planes

By John H. D. Blanke

IN the May and June issues of POPULAR AVIATION appeared a story of the pioneers in gliding and sail flying, in the March issue a description of five recently built outstanding German gliders and in the February issue an account of the Fourth German Seashore Sail Flying Contest held at Rossitten. The activities of the German sportsmen in the field of gliding and sail flying are now supervised and furthered by the Rhoen-Rossitten-Gesellschaft E. V., which protects also the types of gliders designed, built or used by its members, against manufacturing infringements. During the few years of its existence it has brought this great flying sport to a state of development where it is drawing the attention of the entire world.

As a result, a representative of the American Motorless Aviation Club or Amac, which was organized recently, has requested the Rhoen-Rossitten-Gesellschaft E. V. to assist them in popularizing the gliding sport on the North American Continent. The German association has therefore consented to send a few of its best members. These are to assist the Amac for about six months in demonstrating to American enthusiasts the assembling and flying of gliders and in providing the needed training facilities for prospective builders and operators of motorless airplanes. Three men who were selected for this purpose and who have with them several gliders are: Mr. Roehre, leader of the sail-flying school at Rossitten, Mr. Lauberthal, an engineer of the Wuerttemberg Air Travel Association and Mr. Hesselbach of the Akademische Fliegergruppe in Darmstadt.

Even though the United States as a people has done wonderful things in aviation, it has neglected to its own loss the development and handling of motorless planes, and it is hoped that the visit of the European experts and the publishing of information concerning European developments in motorless flying in POPULAR AVIATION will bring about a revolution in our attitude towards this special field of aviation.

Ferdinand Schulz in one of his famous record making gliders.

Readers are naturally interested in knowing where to obtain additional facts on gliders. Unfortunately very little has been published on this subject in the English language; the author knows only of one book and this is "Gliding and Soaring Flight," by J. Bernard Weiss, obtainable through POPULAR AVIATION. An authoritative work in the German language is, "Der Gleit und Segelflugzeugbau," by Alfried Gymnich, from which we will now take descriptions and illustrations of various types of gliders that have been found to be of exceptionally good design. Some of the performances effected with these gliders have been stated in previous articles. In later articles we will deal with the more practical points of motorless flying.

The simplest type of flying apparatus is represented by the Von Platz glider shown in Fig. 1. The front edge of a triangular piece of sail cloth forming the wing surface is fastened to a solid wooden frame beam and the rear tip to the end of the skid beam. This skid beam

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curves sharply upward in front, thus providing a seat for the flyer. The tips of two other and smaller triangular-shaped sail cloths forming the rudder surfaces are each fastened to the front end of the skid beam and

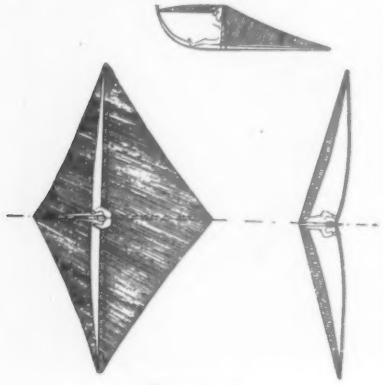

Figure 1

also to the ends of the frame beam. A stick runs along the shorter side of each rudder surface, being fastened to it, from the front end of the skid beam and terminating in a handle which can be operated by the flyer. When the two handles are raised or lowered in unison, the rudder surfaces act as altitude control, and when the two handles are raised or lowered out of unison, the rudder surfaces act as transversal or direction control. This glider is easily disassembled and packed for shipment, which is a desirable feature when flyers wish to attend gliding contests in various localities. It was first tested for stability by using a sand bag on it; and its flying ability has been proved in the dune territory of the Dutch coast which, by the way, is in Holland.

The Pelzner hanging glider shown in Fig. 2 was designed and built by Pelzner. Each of its carrying surfaces or wings consists of two beams of solid red fir with ash girths attached above and below. The front beams above and below measure 4 by 0.5 cm. (1.6 by 0.2 in.), the upper rear beam 3.6 by 1.1 cm. (1.4 by 0.4 in.) and the lower rear beam 3.5 by 0.8 cm. (1.4 by 0.3 in.). The wing surface struts are attached to these beams and re-enforced with crossing steel wires as shown. The cell is built with two struts and slightly staggered forward, the lower wing having a slight V-shape. The wings may be detached at the center, being secured with four bolts. The two longitudinal girders which connect the tail surface with the wing surfaces, are located about 40 cm. (16 in.) apart in order to leave space for the flyer between them; they are re-enforced with diagonally running wires and in front they are braced with two braces running to the upper ends of the rear inside struts. The rudder cable of the side rudder leads in front over a pulley and is manipulated with the right hand. The stabilizing surfaces are covered on both sides; originally the wings were covered only on one side, but later they were covered also on both sides. The Pelzner biplane is considered a light, low-priced and ideal sport glider, having as its most favorable gliding angle in quiet air 1:6 or one foot drop every six feet.

The dimensions shown on all drawings in this article and previous articles on gliders are given in millimeters. In order to obtain the dimensions in American units, simply divide millimeters by 25 in order to obtain inches. For general purposes the dimensions and other figures relative to the types of gliders described in this article, have been converted into American units and arranged in Table I for the convenience of the readers.

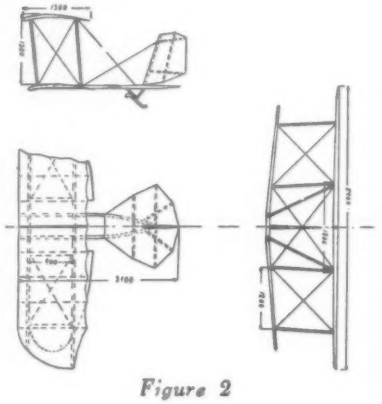

Figure 2

H. Muttray, R. Seiferth and R. Spiess have designed the Dresden Schooling Biplane Glider shown in Fig. 3, which was built in two months by the Fluchtechnischer Verein, Dresden. The upper wing surfaces are carried straight through, being fastened divisible to a canopy. The lower wing surface is attached to the sides of the fuselage, is V-shaped, staggered slightly to the rear, 25 cm. (10 in.) above the ground next to the fuselage and 40 cm. (16 in.) at the wing ends, and has a slightly larger starting angle than the upper wing surface. Each wing surface has two box frames 4 cm. (1.6 in.) wide and 6 to 9 cm. (2.4 to 3.5 in.) high, and the side walls are sparred. Two layers of veneer wood glued together cover the front edge of the wings in order to obtain a good edge to the air. The canopy struts are glued two-fold, drop-shaped, hollow and wrapped with linen. The square fuselage has a maximum diameter of 70 by 70 cm. (27.5 by 27.5 in.), is drop-shaped in longitudinal direction with an upward curve in the rear to protect the control works and terminating in a horizontal plane; it is covered with fabric. The altitude and side runners are built as one piece detachable from the fuselage and operated with ropes.

The chassis consists of two skid beams consisting of several layers of glued ash wood and tied to the fuselage transversally by means of two bows of ash wood; additional elasticity is secured by adding rubber blocks. This biplane has proven exceptionally suitable for schooling purposes and would be adaptable to a group of sport flyers who plan to establish a summer camp in a suitable country site for the dual purpose of seeking recreation and learning to glide. The original Dresden 1921 glider made several hundred flights without serious damages, some of the flights covering 10 minutes of time and nearly two miles of distance.

The glider Edith shown in Fig. 4 was designed and partly built by members of the Akademische Fliegergruppe der Technischen Hochschule in Darmstadt. It is excep-

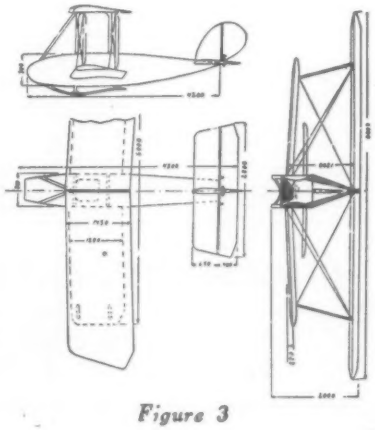

Figure 3

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tionally well suited for static sailing; for example, in 1923 Spiess flew with it for 1 hour and 17 minutes and sometimes remained for fifteen minutes motionless in the air above the slopes. The wing surface of this

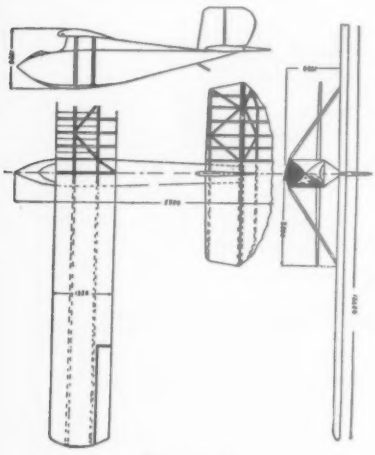

Figure 4

strutted biplane has a profile depth of 17 cm. (7 in.), is divided at the middle and built by the use of two trusses. It is supported two meters (7 ft.) from the middle by two parallel running struts on each wing. The nose is covered with plywood. The ribs are 30 cm. (12 in.) apart and between every two ribs is an auxiliary rib. The two trusses are tied with diagonal struts to prevent torsion. The transversal control is effected by means of narrow rectangular flaps linked to the rear truss. The fuselage is 5.15 m. (17 ft.) long, is built with solid timbers without the use of diagonals and planked with plywood. At the pilot's seat it is of five cornered cross section, further back of rectangular cross section and terminates in a horizontal plane. At first two flexible skid beams of ash wood were located 20 cm. (8 in.) beneath the fuselage, but later a center skid beam was substituted.

The Konsul glider shown in Fig. 5 was designed by Botsch and Spiess and built by the Bahnbedarf A.-G. This free-carrying or non-re-enforced hiplane with a side proportion of 1:15 has, in spite of the large span, no struts for wing support and only one truss. This truss is box-shaped in the 8 m. (26 ft.) long center section and I-shaped in the exterior section. The front of the wing surface from the upper side to the lower side of the truss is covered with plywood, thereby preventing distortion. The wing profile decreases towards the wing tips, as in many types of gliders. Each banking flap is so connected with the side rudder on its side that it operates even though the side rudder should fail. The fuselage, covered with plywood, is fish-shaped with sharp edges above and below to secure the necessary keel effect. The central skid beam is covered with fabric and made elastic with rubber wrapping. At a flying speed of 14.8 m. (49 ft.) per second the best gliding angle is 1:21.4. The Konsul was used in the year 1923 to make a record flight of nearly 12 miles.

The Vampyr glider shown in

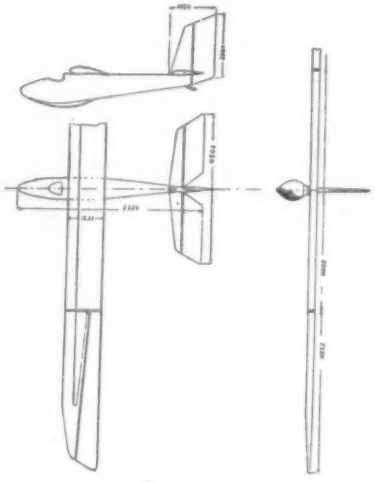

Figure 5

Fig. 6 was designed by Martens, Hentzen and Blume according to a sketch of G. Madeling upon the suggestion of Dr. A. Proell and H. Dorner and built by the Hannoversche Waggonfabrik; this is an example which shows that the skill and study of a number of persons and adequate manufacturing facilities may be necessary in order to build a good and safe glider. This free-carrying biplane has an average side relation of 1:10. Its wing surfaces consist of a middle section 6.6 m. (22 ft.) long and two end sections, each 3 m. (10 ft.) long. The profile of the wings is 25 cm. (10 in.) deep at the centre and decreases towards the tips. This is the first glider in which the wings were built with a truss and the front edge covered with plywood. The I-truss is located in the center line of the pressure area and designed with fir wood girths, and plywood passpieces or intermediate pieces. The ribs are arranged in lattice design and in spite of the light weight of this particular construction due in part to the judicious selection of the kind and size of wood, each rib can support a load of 40 kg. (88 lb.) without breaking. The main supporting ribs are 50 cm. (20 in.) apart, one or more auxiliary ribs being added between them, depending on the forces to be met with in each part of the wing.

The frame is covered with fabric, impregnated and varnished. The wings are attached to the fuselage by means of beams, struts, bolts and fittings in such a way that a suitable support is obtained against every pressure from whatever direction during flight. The rectangular fuselage, covered with plywood, terminates in an horizontal plane and is of special shape in the front section. The altitude rudder is operated with a rod connected to the stick and the side rudder with foot pedals and rope. The chassis consists of three rolling balls shaped like foot balls, with their so called axis in the fuselage; they are located one in front and two side by side further back.

The same group of men which was active in completing the Vam-

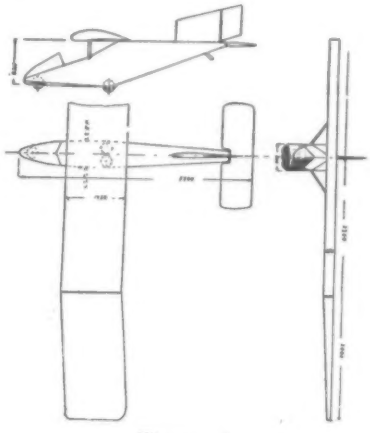

Figure 6

pyr, was active also, a year later, in completing the Greif glider, efforts being made to reduce weight and width of span in order to obtain a glider that could be controlled more easily. This free-carrying monoplane, shown in Fig. 7, made many

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flights, one of them lasting 45 minutes; but in spite of the more favorable aerodynamic design it was not as good a glider as the Vampyr; the shape of the wings was unfavorable, the side proportions bad and the

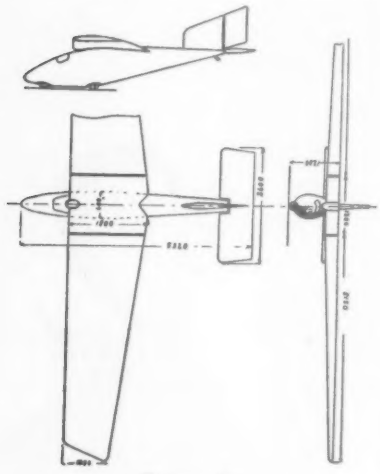

Figure 7

pilot was almost completely enclosed in the fuselage, which prevented him from sensing the air currents which he must feel adequately and keenly in order to take advantage of them so he may keep his glider in the air for as long a period or as far a distance as possible. The center section of the wing, 1.3 m. (4 ft.) wide, is attached rigidly to the fuselage as a canopy, to which the 5.15 m. (17 ft.) long side sections are fastened. The profile of the wing is 28 cm. (11 in.) deep and decreases towards the tips. The wing trusses are designed much like those of the Vampyr glider. The wing tips are covered at their lower side with sheeting in order to protect them against damage in landing. It would be impossible to mention in this article all the details of each glider and therefore only those details are given that appear most important and that suggest to the reader the various arrangements in design and construction that are possible in building a glider.

The Pelikan glider shown in Fig. 8 was designed by Guenther, Mertens and Meyer upon the suggestion of Dr. A. Proell of the Flugtechnische Forschungsinstitut der Technischen Hochschule Hannover, and built by the Hannoversche Waggonfabrik. It represents an outstanding development from the Vampyr and the Greif gliders, but in contrast to them has flaps for transversal control. The wing surfaces are divided into three parts, a truss construction being employed. The wing nose is shaped into a torsion-resisting tube by being covered with plywood. The fuselage is also covered with plywood, is of oval cross section and terminates into an horizontal plane. The starting and landing chassis consists of two roll balls located one back of the other as in the Greif glider. The transversal rudders are unusually narrow and long; the altitude and side rudders are square and have no guiding surfaces. The falling speed of the glider is said to be only 0.447 m. (1.5 ft.) per second and the gliding angle 28.9. In the year 1924 Koch

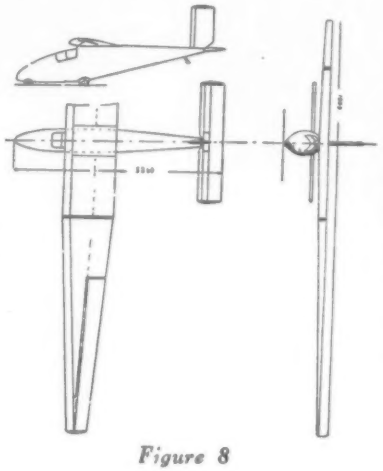

Figure 8

flew the Pelikan over a comparatively narrow dune section for 30 minutes.

The members of the Flugtechnischer Verein Dessau in cooperation with the Junkerswerke designed and built the glider Dessauer, shown in Fig. 9. The wing surface has a single truss with torsion-resisting plywood nose, and is divided at the middle, where the undergirth is attached to the fuselage by a link and the uppergirths are pressed tight against the fuselage by the pressure in flying. The ribs of the five-sided fuselage have no diagonal stays, for the covering of plywood takes up the necessary forces. The chassis consists of a central skid beam with air bumper. A short strong strut supports each wing. In order to reduce the shock in landing, rubber bumpers with an elastic depth or expansion length of 5 mm. (2 in.) are placed in the struts. The altitude rudder is covered with plywood and the transversal rudder is operated by means of differential control, that is, if the flap on the right wing is raised, the one on the left wing is lowered, or vice versa. This arrangement assures a more effective transversal control of the glider. Details in regard to the preparation and assembly of the various parts of the gliders will be given in other articles, so that the readers may attain a more practical knowledge of glider construction.

The glider Geheimrat shown in Fig. 10 was designed by G. Nicolaus and Hoffmann, built by the Bahnbedarfs A.-G. and belongs to the Akademische Fliegergruppe der Technischen Hochschule Darmstadt. In a gliding and sailing flight in 1922, Hackmack flew it one and one-half hours, reaching an altitude of 1,050 ft. above the starting point. The center section of the wing surface is 6 m. (20 ft.) long and has a profile of 24 cm. (9 in.) depth. The trapeze-shaped outer wing sections are 2.75 m. (9 ft.) long and their profile decreases towards the wing tips. The wing surface consists of a main and an auxiliary truss, is covered with plywood and the main truss may be turned to a certain ex-

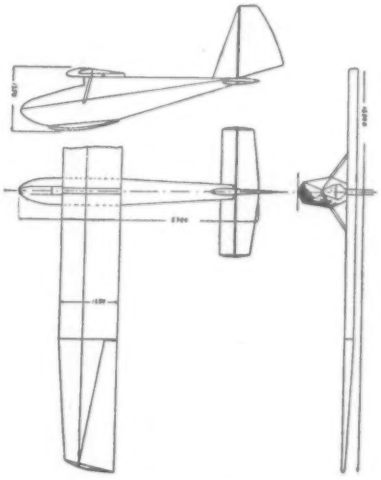

Figure 9

tent by means of a stick control and rods for directing the course of the glider, as is done in a number of types of gliders. The chassis consists of two skid beams running along the lower edges of the fuselage. The space between the fuse-

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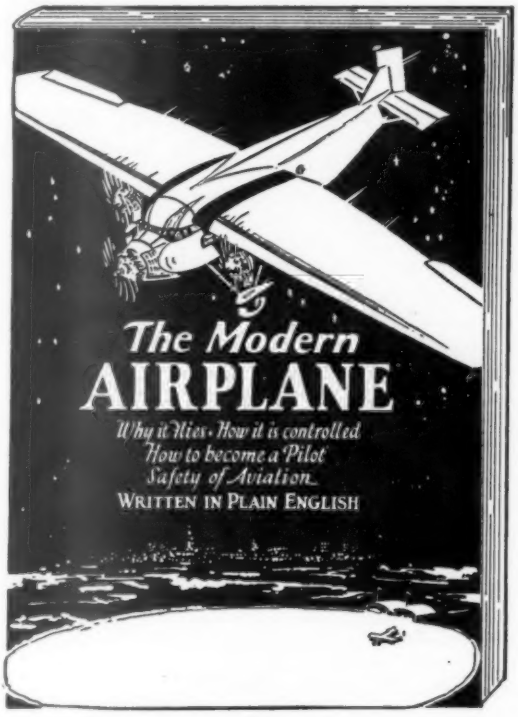

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lage and skid beam is filled with an air cushion and covered with metal sheeting. The altitude rudder is adjusted by means of a small lever which is set for a certain position before starting in respect to the wind

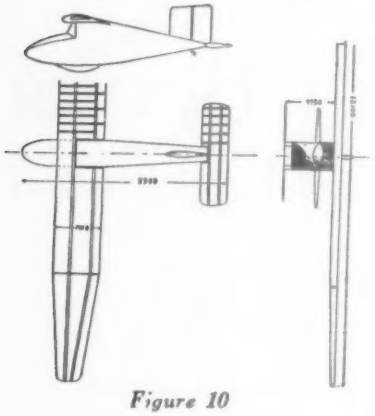

Figure 10

conditions prevailing for a flight.

The Dresden monoplane glider shown in Fig. 11 was designed by H. Muttray and R. Seifert and built by members of the Flugtechnischer Verein Dresden. It is a strutted hiplane with wings adjustable for control in flying. The wing surface is in four sections, the 2 m. (7 ft.) long outer sections being detachable to permit shipments of the glider in a railway car. The wing structure consists of a box truss with interior diagonal bracing and sparred side walls, the safety factor of the truss being seven times. The wing nose is covered with plywood. The position of the rotating axis of the wings is such in respect to the center of gravity and the center of pressure, that no forces act upon the control stick during normal flying. In order to prevent eddy currents at the wing edges, the wing ends are terminated in a point. The wings are fastened to the fuselage by means of a link and a special structure. Each wing is braced against the fuselage by means of steel tube struts attached as a joint. Thus the wings can be turned in unison for ascent or descent control, and out of unison for transversal control. The fuselage is of four-sided cross section of 60 by 70 cm. (24 by 28 in.) maximum diameter and terminates in a horizontal plane for placement of the balanced undampened altitude rudder, which is controlled by a special lever but which is ordinarily not manipulated while flying

In the 1923 contest the wings and the altitude control were coupled in such a way that a certain increase in the angle of the wings caused a corresponding identical movement in the altitude control. Due to this simultaneous adjustment of the surfaces and the altitude rudder, the fuselage was supposed to keep its direction of flight, so as to avoid momentums of inertia or slowing down in the longitudinal direction. The front part of the fuselage consists of lists of ash wood glued several times. The chassis is identical to that in the Dresden biplane glider shown in Fig. 3. In quiet air the Dresden monoplane glider has a gliding angle of 1:14.6.

The Messerschmitt glider S. 13, shown in Fig. 12, was designed and built by Messerschmitt. Instead of the two-stick control system only one control stick is installed. The damping surface can be adjusted by a lever that is fastened after the adjustment is made. The surfaces are not adjusted by way of ropes, but by way of a strong steel torsion tube running alongside the truss. The wing surface is in three sections; there is only one truss and between each two main spars is an auxiliary spar. The fuselage is of rectangular cross section and drop-shaped in the longitudinal profile; it carries a long elastic central skid beam. Two short

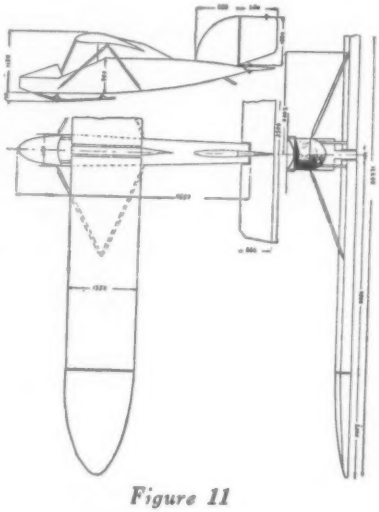

Figure 11

struts brace the wings on each side from the rear against the fuselage. The wing control is parallel for one-third of the surface and differential and distortional for two-thirds of the surface. The compensated dampened altitude rudder is also operated by means of a rod, and the

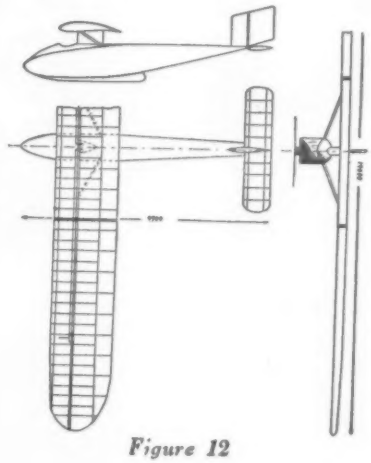

Figure 12

side rudder is operated by rope. Only the middle section of the wing surface is cellulized so as to secure an easy distortion of the remaining surface. A maximum altitude above the starting point of 990 ft. was reached with the Messerschmitt glider.

Types of gliders that figured prominently in the gliding and sail flying contests in Germany during the years 1921, 1922, 1923 and partly in 1924 have thus been described briefly. Their design should give suggestions to readers who are desirous of building gliders, preferably, in the size of models before attempting to build gliders of natural size. Many of the big engineering projects of today are first constructed as models; this permits the testing of the object without involving large proportions and if changes are made necessary, they can be made and tested in the models, thus rendering the cost far less than if these changes would have to be made on the actual engineering job. Gliders could thus be designed first as models, easily altered, and new designs developed; and if they prove successful, the chances are that the natural size glider will also be successful. In future articles information will be given on the actual construction of a glider, and other information which has been requested by a number of readers.

On page 73 will be found a table showing the approximate dimensions and weights of eleven German Motorless Planes, giving the span.

(*Continued on page 73*)

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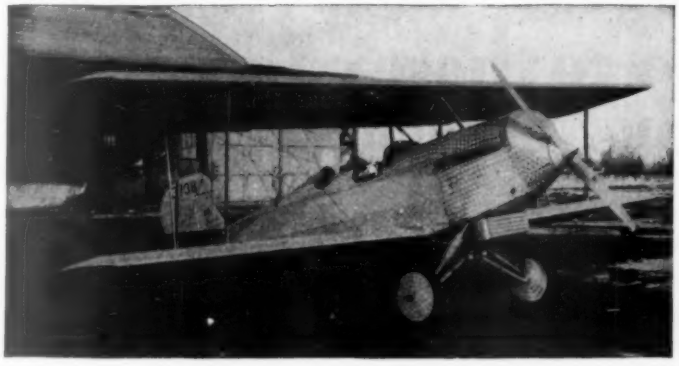

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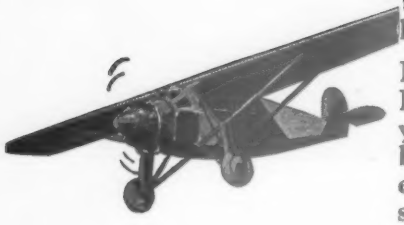

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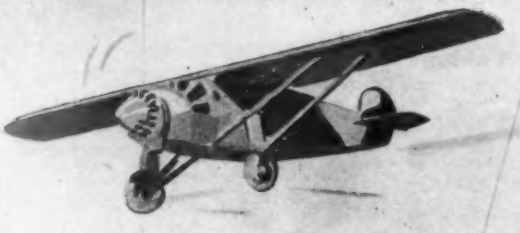

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FLYING INSTRUCTION

Please mention Popular Aviation when writing to advertisers

Scale Model Pointers

By Bertram Pond

HERE is a picture of a Fairchild model, just to give you a few ideas.

It has a span of 27 inches, weighs 1.6 ounces, has folding wings just like the big Fairchild, flies twenty-three seconds, and is built to exact proportions. Balsa wood is used quite extensively. The windows are covered with a transparent material same as the doors which open and close. The addition of light balsa dummy cylinders would complete the effect.

Control Surfaces

For best results, fasten control surfaces rigidly when flying balance is obtained. It is better, however, to make the control surfaces non-operatable. The extra spars and hinges add weight, get out of adjustment and often spoil the appearance of a model. If you must, paint a stripe to imitate the hinge line of a control. As you have no pilot in a flying machine scale model the extra controls mean unnecessary work.

The nose should be made detachable to wind the motor with

a winder. Two wire hooks and a dress snap work very well on this model. The front of the motor stick is mounted to this nose by a pin, and two small washers are cemented on each side of the motor stick which makes the pin act as a hinge. The motor stick can pivot up and down but not sidewards.

The rear of the motor stick is supported on a wire loop fastened at the rear of the body. The end of the motor stick is slipped into this loop, and then the nose is snapped into place.

A stout rubber band holds the folding wings in flying position.

The wing hinges are simple music wire clips.

Launching Fragile Models

POPULAR AVIATION knows that boys and young men have considerable mechanical ability and can build and fly ordinary types of models without lengthy and tiresome instructions. However, there are some points which contest experience has proven need additional and particular instruction as well as some practice. We refer particularly to A frame models.

There are little tricks in handling, launching and flying light and fragile outdoor duration models. These simple instructions will save you considerable worry and enable you to fly flimsy A frame models in a gentle breeze. Of course, the frame must be strong enough to stand a little more than the pull of the motors. Likewise, the wing must not buckle, twist or bend very much under the weight of the machine in flight.

Point No. 1

When hooking the motors on the front hook, after winding, hold the nose of the A frame until the motors are slipped in the "cans" as the frame buckles easily when the rubber is outside the "cans."

Point No. 2

In a contest, take one trial flight with the model about one-half wound to check the elevation.

Point No. 3

Have the assistant hold the model a moment after it is wound up while you sight at the nose and check up on the angle of incidence of the elevator and the centering of both surfaces with the frame. Set these quickly as waiting long with the motors wound kills "pep."

Point No. 4

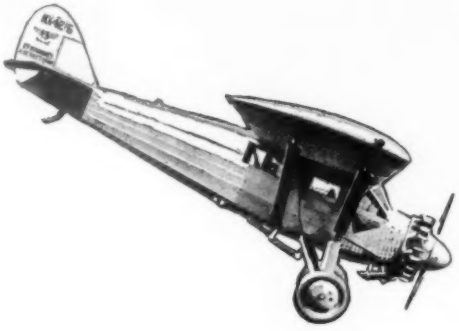
If there is much breeze, it is well to wind with the machine held close to the ground or better behind the wind screen of your model box, hanger, or other wind break. The winder is usually the flier so be careful to keep the nose of the model down when the flier exchanges places with the assistant at the propellers.

Point No. 5

The flier, who should have conferred with the judges regarding his turn for flying, should move to an open space where the air is free from pockets and "bumps." Face the wind squarely, lower the rear of the model and raise the nose slowly until the nose is almost being supported by the wind. Launch the model on a level keel and a flight is assured. Raise the machine up level as far as possible for a good start above the air ed-

dies nearer the ground. (See picture of "Bring the nose up level.") If a wind gust raises the nose quickly, let the model swing up over your head and then bring the nose down. Swing around into the wind again, with nose down,

(*Continued on page* 89)



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PA-1

The Woolworth Tower as seen by a Fairchild Camera Man.

Art in Aerial Photographs

By E. W. Fuller
Chicago Aerial Survey Company

THE aerial camera, like the poet's eye, is capable of "glancing from heaven to earth, from earth to heaven." Little wonder, then, with so vast a scope that it now and then picks up images that are rich in artistic content. I say now and then, because most often the aerial photographer, being a creature of commercial necessity, must devote most of his energies to procuring views of business value and, though he may have a strong flair for beauty, is obliged not to indulge himself too freely outside the definite work in hand.

To procure anything of real artistic merit requires much experimenting and countless trials; they are expensive. The profession are of one mind in abominating the waste of film at fifty dollars per flying hour. Besides, composition in a photograph generally requires contemplative deliberation—and deliberation on the part of an airplane is still awaiting the day of the helicopter. Balloons and dirigibles are, of course, in large measure, at the mercy of the winds when it comes to hovering, and anyway the price per hour for dirigibles is in excess of the fifty—somewhat.

I mention these facts in explanation that the public may understand why, with seemingly so grand a spectacle as the cloud-filled sky with its myriad marvelous combinations of beauty, there remains such a dearth of really magnificent pictures presented by the art of aerial photography. However, what has been accomplished indicates what an important contribution to the artistic will be made by the aerial photographer.

In examining an aerial photograph with an eye to artistic balance, it is well for the observer to bear in mind that the scene he views at leisure existed only a small fraction of a second for the aviator.

The accompanying illustrations are presented in the hope that they may provide increasing enjoyment the more you look at them.

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Mohawk Pinto - Pony of the Air

What's Doing in Washington

POSTMASTER GENERAL HARRY S. NEW, before a conference of National Association of Commercial Organization Secretaries, meeting in conjunction with the annual meeting of the Chamber of Commerce, stated that air mail averages are over 5,700 pounds a day. He also said that sixty-three of the most important commercial cities of the nation are within the confines of this network, leaving only a very few of any prominence to be covered later. The total mileage of the air system is brought up to 12,550, with twenty-two routes in operation, and five others under contract. Two additional routes are under advertisement and contracts will probably be let during the year. Postmaster New prophesied an average of over 30,000 miles daily before the end of the year.

The Department of War authorized a cross-country flight by two PW-9 (Pursuit) planes in which the airway sites in the Panama Canal Zone were studied. The purpose of the flight was to investigate the airway possibilities from the Canal Zone to the United States; to stimulate the development of commercial aviation in Central America; to test the reliability of the PW-9 airplane on long flights; to test the feasibility of transporting a pursuit unit from the United States to the Canal Zone in case of an emergency, and to enable the Twenty-fourth Pursuit Squadron, stationed at France Field, from which the two planes came, to be at the gunnery matches which took place at Langley Field from May 25 to June 10, 1928.

A Naval Inquiry Board, headed by Rear Admiral William H. Standley, investigated the causes and prevention of the naval air corps accidents which have taken place. Rear Admiral R. H. Leigh, Chief of the Bureau of Navigation, stated that he was compelled to recommend the establishment of this board in view of the fact that many naval aviators were breaking the ordinary rules of discipline. He said that twenty of the deaths came as a direct cause of low stunting, which is in violation of sensible judgment, and that 80 per cent of the accidents occured from the "human" element rather than mechanical. It is expected that this board will reduce such accidents considerably.

The Bureau of Aeronautics, Department of the Navy, is conducting a series of experiments to test the practicability of equiping dirigibles as airplane carriers, Rear Admiral W. A. Moffett, Chief of the Bureau, announced recently. Preliminary plans for the tests are now under consideration but the experiments themselves will not be conducted for several months. European countries have also carried on these experiments, but Admiral Moffett said that these would be on a much larger scale. The system that would be employed contemplates the "hooking" of the airplanes on to the dirigibles while in flight. The airplane would syncronize its speed to that of the dirigible and attach to a hook that could be lowered and hauled up to a stabilized position beneath the other craft. A plan of this kind, if feasible, would increase the cruising radius of aircraft and add to their value in time of war.

The Department of War announced that four airplanes built for Cuba will be inspected by its officers, at the request of the Cuban government. The tests will be conducted at the plant of the Consolidated Aircraft Corporation, Buffalo, N. Y., which is under contract to produce the four airplanes. In order to fulfill the request of the Cuban Government, the War Department has asked for copies of the contract, blue prints, and specifications for purposes of inspection.

Through the request of the Secretary of War, Major Barton K. Yount, Air Corps, assistant Military Attache for air, attached to the American Embassy in Paris, attended, as the official representative of the United States, the Aviation Conference held in Madrid, Spain, May 29. The Spanish Ambassador wrote to the Secretary of War, extending the invitation of his country that the United States be represented by delegates at the meeting of the Comite Juridique International de l'Aviation, and Secretary Davis immediately designated Major Yount for the position.

Five additional airplanes were sent to Nicaraugua by the Marine Corps, it was announced recently at Marine Corps headquarters. A trimotored "Fokker" transport plane left the Naval Air Station at Anacostia piloted by Lieut. H. D. Palmer, accompanied by a mechanic and a radio operator. One stop was made en route; that at Miami, Florida. The other four are amphibians, equipped with machine guns, which will be used for extensive patrol work.

Announcement was made by Postmaster General New that a new air mail route between Albany and Buffalo, N. Y., began operation on June 1, 1928. This furnishes a trans-continental air mail service between Albany and intermediate points for connection with Cleveland, Ohio, with the New York-San Francisco planes. The schedule provides that the plane will leave Albany at 10:30 a. m. and arrive at Cleveland at 4:35 p. m. It will arrive at Chicago, Ill., at 7 p. m. and at San Francisco at 5:35 p. m. the following afternoon. On returning the plane will leave Cleveland at 12:15 p. m. arriving at Albany at 4:30 p. m. The Colonial Western Airways, Incorporated, New York City, are the contractors for this route. This distance between Albany and Cleveland is 452 miles, and the service calls for a daily one except Sundays.

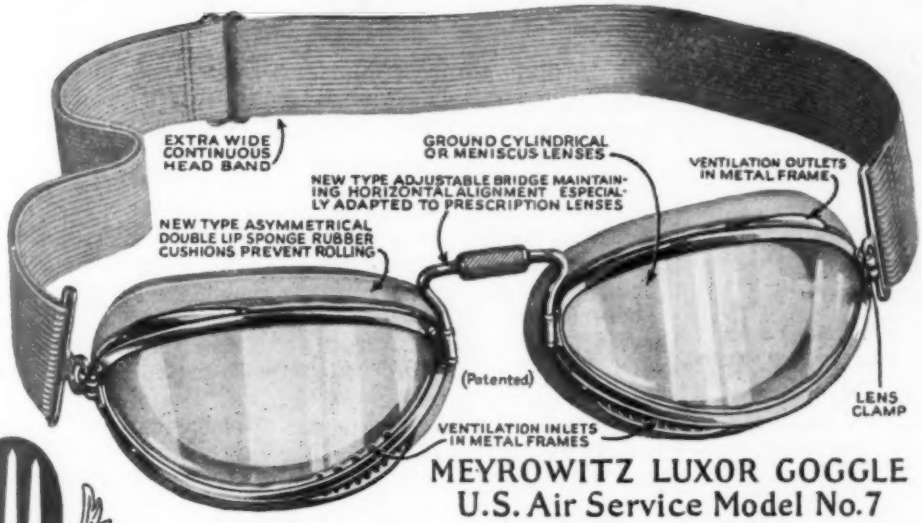
Establishment of an airport in the city of Washington, as proposed in pending legislation in Congress, is not in conflict with President Coolidge's financial program. This was stated officialy recently, and signifies that the bill would meet his approval and would create an airport in our capital.

Second Assistant Postmaster Gen-

(Continued on page 78)

Meyrowitz Luxor Goggle No. 7

New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With white cylindrical bent lenses	10.75
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Meyrowitz Luxor Goggles are made with amber, euphos (green) and smoke tinted lenses as desired. Also special lenses conforming to U. S. Army and Navy specifications. Lenses accurately ground to prescription can be fitted in any model.

This special goggle, originally made for the sole use of the crack pilots of the Army and Navy, is now available to commercial pilots. Highly improved with new unusual features, there is no other goggle in the world like Luxor No. 7.

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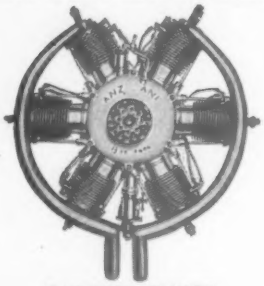

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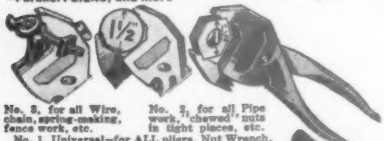

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Aero Club News

Minneapolis, Minn.

Mr. Harlan Bynell of this city, cooperating with Mr. Willard Greene, has aroused considerable interest in the formation of an aero unit. A temporary meeting place has been secured and the plans have been progressing rapidly. The local press has been very favorable with publicity and some interesting news is forthcoming.

Chicago, Ill.

An attempt to form a flying unit in Chicago to be known as the Illinois Flying Club has been undertaken by Mr. Frank G. Coon, 7633 Bosworth Ave., Chicago, Ill., and anyone interested, is invited to write.

Mountain Lakes, N. J.

Major G. A. Reeder has under his supervision one of the most active aero clubs in this state. Plans are under way for the purchase of a Travelair plane and one of the members has already purchased a Challenger through a local agent.

The Bronx, New York

This community stands out as one of the most active as far as aero clubs are concerned, in the country. The Bronx Aero Club, Aviator's Club of the Bronx, Junior Military Aviators, and another, the Columbia Aero Club, is under way of organizing. It started off with a membership of forty and is taking in new members at every meeting.

Upper New York

The section has become aeronautically active in and about Herkimer through the efforts of M. A. Knights and associates, who have formed the Herkimer Aero Club. The first meeting was well attended and plans for weekly meetings and ground study were outlined.

Berwyn, Illinois

This town, though not great in population, is keenly interested in aeronautics and its citizens, under the guidance of Mr. Clarence Schultz, are actively taking up the work of organizing an aero unit, through which it is hoped the community will become extremely air-minded.

Denver, Colorado

An effort to form another flying unit in this city is actively under way, headed by John E. Tomlinson, John Grimes, R. R. Yohner and F. Wallis. The organization will be known as the "Denvorado" Flying Club. Mr. Tomlinson writes that at the first meeting fifty were present and plans for organization were talked over.

Long Beach, Calif.

The Long Beach Junior Aero Club has been organized for the purpose of educating the younger generation in the fundamentals of aviation. To become a member, a boy (over 14) must make a model airplane that will fly, design some ship, or tell the members what he has done in the line of aviation. After he has demonstrated his ability, the directors vote upon his elegibility. The studies are the history of aviation, flying, observer work, principle of flights, cross country flights, principles of aeroplanes, etc.

Boston, Mass.

Aviation interest is catching on to such an extent in New England that practically every Boston suburb now has an aero unit under way. The Tri City Aero Club embraces quite a bit of territory, but J. Sumner Adams of Medford, Mass., is expected to organize the Medford Aero Club. Later reports will be forthcoming.

New Britain, Conn.

Mr. Merton J. Clark of this community announces the development of the Norman Prince Aeronautical Society, whose object will be to promote aviation through the building and piloting of gliders and models. As clubs of this character are not very numerous, much success can be expected.

Aero Club News

Providence, R. I.

At the initial meeting of the Little Rhody Aero Club at Providence, R. I., Richard N. Ballard was appointed chairman of the committee to procure the organization of the club. Approximately thirty-two persons, interested in aeronautics, were present, twenty of whom enrolled.

McKenna, Washington

The West Coast, which has responded so actively to the call of aviation, will add another aero club to its roster through the efforts of Frank C. Barber and others who have organized the McKenna Aero Club. Mr. Barber is formerly of the Marine Aviation Service and would like to hear from someone who has a good serviceable second-hand machine for sale.

Rutherford, N. J.

Captain Heywang and Captain Dickinson attended the initial meeting of the Rutherford Aero Club held recently. Over forty members attended and the local papers have given the organization of this club splendid publicity.

Port Angeles, Wash.

Mr. Ray Seibel of this community reports the organization of an aero unit with an initial membership of forty. The plan followed is an enrollment fee of one hundred dollars that will allow flying time and instruction at the rate of five or six dollars an hour.

Tarrytown, N. Y.

The Tarrytown Aero Club, recently organized, has built up a membership of over forty paid-up members who are meeting weekly for ground instruction under the supervision of G. F. Helwig, club President. It is hoped that funds will be made available for the purchase of a seaplane so that this unit may fly from the Hudson River this summer.

Holland, Mich.

The Holland Aero Club, organized recently by Mr. Wallace Kykhuis, has developed a membership of thirty-five paid up members and real flying activity should soon take place.

Detroit, Mich.

One of the livest units in Detroit is the Humming Birds' Flying Club, organized by the employees of the Federal Aircraft Co. Mr. Cliff R. Wilson is the President of this new organization and the size of the club does not correspond to the name of the tiny bird they have chosen for their name.

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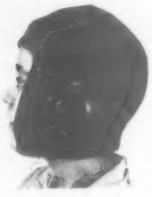
FLYING GEAR



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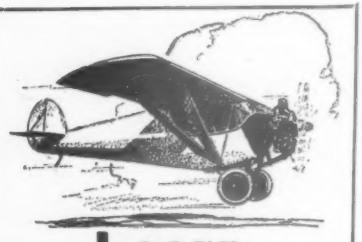

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The Design of the Bremen

By John H. D. Blanke

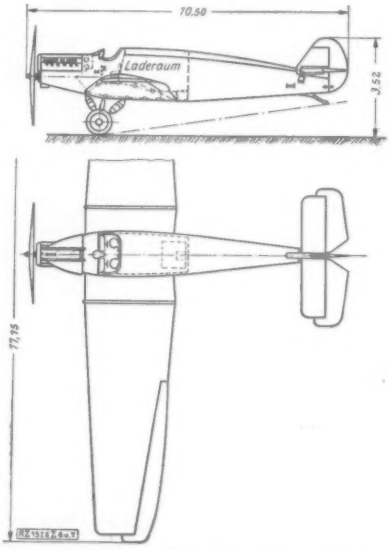
THOSE of us who were so fortunate as to catch a glimpse of the sistership of the transatlantic plane Bremen, will have a more or less distinct idea of the general appearance of this Junkers "loplane." As a rule it may not be advisable to pepper a description of an historic plane with too much technical detail; but in this case the exception will have to be the rule, for there have been many requests for a brief description of the "innards" of the Bremen. The facts given here have been verified through an article in the *VDI-Zeitschrift* of April 28, 1928, pp. 574-575, official journal of the Society of German Engineers.

The Junkers plane Bremen which started from the air field Baldonnel, Ireland, on the morning of April 12, 1928, and landed on a lake on Greenely Island on the coast of Labrador at the south end of the Belle Isle Strait after forty and one-half hours of flying time, with Captain Koehl and Major Fitzmaurice at the controls and Baron von Huenefeld as passenger, is an all-metal freight and air mail plane. It is built principally of Duralumin, as is every other Junkers plane; and it is a non-tensioned free-carrying "loplane" with wing surfaces and wing thicknesses that decrease towards the wing ends.

The carrying surfaces consist of three parts, the center section and the two side sections. The center section is connected rigidly with the fuselage and the two outer sections are fastened to it by means of ball and socket joint connections with screw caps of chrome nickel steel. The wing bars of Duralumin tubing are riveted to the supports by means of Z-stays of Duralumin. The wing surface of corrugated sheet plate is connected with rivets to the tubular bars. The wing nose and the terminations of the carrying surface consist, however, of sheet plates. The free-carrying control works are constructed similarly.

The individual ribs of the fuselage are connected with each other by means of profile supports of Duralumin. The center section of the fuselage, which consists of the motor frame, aviators' seats, passenger's seat and cross-sectional center piece, constitutes as the strongest part, the foundation of the fuselage design. If the chassis should be lost, the sturdy construction of the center frame work is capable of absorbing the shocks. The fuselage is covered with corrugated sheet plate. The chassis consists of four steel stays covered with sheet plate of Duralumin in stream-line shape, a rubber spring arrangement being built into each stay; and of a divided axis at the turning point of which two V-stays fastened to the fuselage are engaged; and also of two wheels.

A 280/310 horsepower motor of the Junkers L-5 design is built into



the front part of the fuselage. This six cylinder motor is water-cooled. At 1,500 revolutions per minute it uses 230 grams or 8.3 ounces of fuel per horsepower hour and 7 to 10 grams or 0.25 to 0.36 ounce of oil per horsepower hour. Its weight without the support, propeller, water and oil is 315 kilograms or 694 pounds. Its cylinders are 160 millimeters or 6.3 inches in diameter and its stroke is 190 millimeters or 7.5 inches. The compression ratio is 1:5.5. The motor is provided with an all-metal adjustable propeller of Junkers design.

The fuel tanks are located in the wings; and for the ocean flight ex-

tra fuel tanks were installed in the freight room. Back of the motor and separated from it by means of a bulkhead for safeguard against fire, are the two pilots' seats, side by side, with control equipment in duplicate and with a switchboard and instrument board in front of them. In order to determine the direction of flying above the sea and in fog, there are two compasses located at the side of the pilots' seats and a third one, a long distance selenium compass, is located in the end of the fuselage.

Between the two seats is a door which leads into the freight room. With the customary design of this type of Junkers plane, 3.5 cubic meters or 124 cubic feet of freight may be stored here. For the flight to North America additional tanks were installed in the freight room for a total capacity of 1,900 kilograms or 4,189 pounds of fuel and 200 kilograms or 441 pounds of oil. When empty, the Bremen weighs 1,360 kilograms or 2,998 pounds; but when loaded including the flyers, instruments, provisions, etc., the weight is 3,700 kilograms or 7,937 pounds. Under normal weather conditions the quantity of fuel carried should have been sufficient for flying a distance of 6,000 kilometers or 3,728 miles. But since the Bremen covered only 3,500 kilometers or 2,175 miles, it may be assumed that the three searovers encountered exceedingly unfavorable weather, especially in the last stage of their historic flight.

My Funniest Trip

By Left Wing Low

JUST as we nose dive to press with this issue of POPULAR AVIATION the returns have started to come in on the "Forced Landing" Contest. From the looks of it, it would seem that every one who ever had a stick in his hand has seen the notice in the June issue. Well, they have until July 15 to get the "Forced Landing" stories in. Enough interest seems to have been aroused to make it worth our while to offer a really good wrist watch for the best story on "My Funniest Air Trip." Stories will have to be in the POPULAR AVIATION office by August 15.

A few readers, or rather, skippers, for they could not have read the former announcement very carefully, insisted on writing us about further details of the first contest. So, just to save postage, and the time of Left Wing Low, who is notorious for saving time, and then doing nothing with it, take notice at this point, that no questions are answered about the contest. All the conditions are found in this notice, and they are few. You must write English—our translator has been laid off for the summer. We are not so particular about grammar, but a little of it won't hurt a bit. As for literary style, Left Wing Low rates writers the way he does pilots—Good, Fair and Rotten, with not much difference between the Good and the Fair. Anyway—style doesn't matter.

Next, all we care about is that the trip actually was taken, by some one you know and can name. None of this "my cousin had a friend whose brother's uncle was the father of a kid who, etc." Name the villain, and try to date it somewhere within a few years. If you have some pictures, so much the better, and if you want them returned, Left Wing Low will do it, if your name is on the back of each one and you remember the little red stickers that cost 2 cents each.

Talking the matter over with Low, we had a difference of opinion as to what was funny. You know, some people will laugh at anything. The first time he took me up and thought it was a good time to show me what acrobatics were, I caught him laughing. But if your story seems funny to you it might seem that way to him.

Well, that's the whole story. August 15 is the last day, story is supposed to be funny, it must have happened, and it should be around two thousand words long, more or less. The prize is a wrist watch, and a good one at that, for the one that appeals to Low's sense of humor. Stories will be returned if you enclose postage and envelope addressed to yourself. By the way, mark them "Funny Trip Contest,"

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With the announcement of the formation of the company came the news that Charles A. Lindbergh had accepted the position of chairman of the technical committee of the new organization which is known as Transcontinental Air Transport, Inc.

Col. Lindbergh's connection with the company was to begin immediately, according to C. M. Keys, the president, who is also president of the Curtiss Aeroplane & Motor Company, and chairman of the executive committtee of the National Air Transport. The position will place the "flying idol" of the country in virtual control of the company's operations as regards selection and supervision of equipment, fields, routes and safety appliances.

The Transcontinental Air Transport has been formed by the Pennsylvania railroad, air interests identified with Curtiss, Wright Aeronautical, N-A-T, the Santa Fe system, and a group of banking interest headed by Blair & Company. A capital of $5,000,000 is available, all subscribed, and it has been announced that no stock will be offered the public.

The first service to be inaugurated by the company will permit passengers to leave New York on the Pennsylvania railroad about six o'clock in the evening, leave the train at a point near Columbus, Ohio, after a night and breakfast on the train, take plane to St. Louis, where a stop will be made for luncheon, continue the air trip to Wichita, Kan., where the passengers transfer to the Santa Fe railroad. The railroad trip will terminate at a point in New Mexico, probably Nogales, where the passengers board a plane for Los Angeles. The entire trip will take forty-eight hours, as compared with at least four days under present railroad schedules.

The initial route has been chosen for several reasons, safety being the first factor. No night flying will be done, and the country over which the flights are to be made is most suitable. The company plans to inaugurate other services in due time, particularly in the eastern and middle western states. These services will connect the transcontinental route with all the principal cities. The additional services will at first follow the general plan of using railroad services at night and planes by day. Among some of the routes now in contemplation are branches from Chicago and the Twin Cities, St. Louis and Kansas City are on the transcontinental line and other western cities will be linked to the new route.

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the Pennsylvania, in commenting on the announcement of the formation of the new company authorized the following statement, which is significant as coming from the head of a great railway system:

"The Pennsylvania railroad has taken this step after careful consideration. Our railroad has become part owner of the Transcontinental Air Transport, Inc., in the belief that the time is ripe for the inauguration of a safe and convenient passenger airplane service in this country in co-ordination with rail facilities."

College Aero Clubs

Popular Aviation is pleased to announce that beginning in the August issue that a new section on College Clubs and Aeronautical Activities will be a regular part of its publication. The College Editor, Edward E. Felker, the former president of the University of Pennsylvania Aero Club and a leader in their development and co-operation, has been working on this section for the past few weeks, but regrets that it cannot be started until the next issue, due to the fact that most of the returns were received too late for publication. The editor hopes that all those having some form of aeronautical activity will contribute regularly to this section. Several pages will be devoted to this section entirely, and it is our belief that it will eventually become one of the most important parts of the publication. Any suggestions or criticisms as to the editing of the section will be heartily welcomed. The editor will willingly aid or assist in any matter possible in the furtherance of this, our common cause.

Some Motorless Planes

(*Continued from page* 58)

length, height, wing width, wing area, and dead weight of each.

Below is a table giving the various dimensions in feet, inches, and pounds, instead of meters and grams for the convenience of the readers.

Approximate Dimensions and Weights of Eleven German Motorless Planes Shown in Figures 2 to 12

Fig. No.	Type of Glider	Span Ft.	Length Ft.	Height Ft.	Wing Width Ft.	Wing Area Sq. Ft.	Dead Weight Lb.
2	Pelzner	18-23	10	4	4	151-178	20-42
3	Dresden	26 and 20	14	5	5	.....	154
4	Edith	40	18	5	4	161	198
5	Konsul	62	21	4	4	237	287 or less
6	Vampyr	40	18	4	5	172	.....
7	Greif	38	17	4	6	161	.....
8	Pelikan	49	17	..	..	161	165
9	Dessauer	41	19	5	4	167	253
10	Geheimrat	40	18	4	5	154	176
11	Dresden	40	15	4	4	167	260
12	Messerschmitt	46	16	..	..	.....	.....

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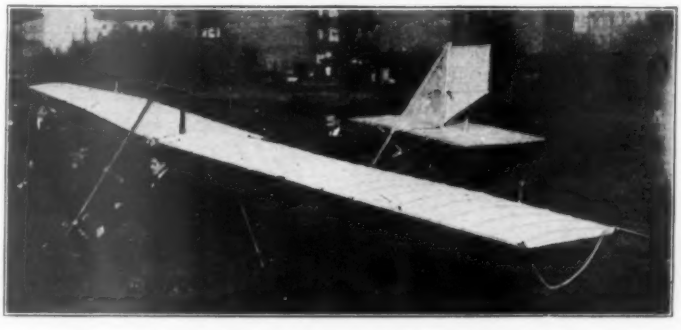

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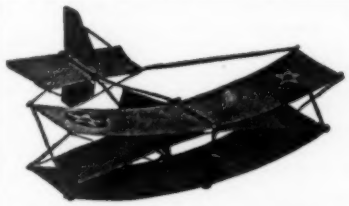

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Pioneer Air Pilots

(*Continued from page* 44)

back at 4:41:37. He had beaten the Englishman's time by forty-three seconds.

That made Moisant the nation's hero; but he never received the ten thousand dollar prize. A protest lodged by Grahame-White was upheld by the International Aeronautical Federation; on another count the Englishman was disqualified and the prize finally went to De Lesseps.

In November the Moisant brothers got a group of flyers together. Moisant went to Havana, Cuba, to arrange for a meet to be held there in December. He was not altogether successful in his mission, and he sailed for Richmond, Virginia, on the 23d. There he joined the International Aviators, as the exhibition group was called. On the 26th he flew over the Virginia State Penitentiary with a resultant flurry of excitement among the twelve hundred convicts.

At Memphis, Tenn., on the 17th of December, he tried for the altitude record. His barograph registered nine thousand three hundred and sixty-four feet, and he was covered with ice when he landed. In a snowstorm, with a gale blowing he flew at Tupelo, Miss., on the the 21st. The spectators became so enthusiastic that they made up a purse of a thousand dollars which was presented to him when he landed. He flew over the business district of New Orleans on the 24th, and he tried again for the altitude record on the 28th. A frozen carburetor forced him to give up the attempt. He had an exciting time in getting to earth. A strong, gusty wind was blowing, and with a dead motor things looked serious. The wind drove him over a tree studded area, and he barely escaped a crack-up. The next day he was caught in a sudden squall that swept in from the Gulf. After a desperate ten minute battle he landed safely.

The Michelin Cup now beckoned to Moisant. It carried with it four thousand dollars in cash, and was awarded each calendar year to the pilot covering the greatest distance in continuous flight around a closed circuit, every part of which was visible to the official observers. An extra gas tank of forty gallons capacity was installed on the fifty h.p. Bleriot that was to be used in the attempt. The last day of the year was picked for the test.

Moisant was very popular with the Central American residents of New Orleans, and they had arranged for the presentation of a gold loving cup on the second of January—the day the troupe of flyers was due to leave. The one for whom it was intended never received it. He was dead.

The morning of the 31st dawned fair. The flight was to start at a field twelve miles from New Orleans on the banks of the Mississippi River, and Moisant flew there. At seven minutes to ten he appeared, flying at a low altitude and with the wind. Suddenly the machine swerved downward, and dropped like a plummet. The horrified observers saw him hurled from the cockpit. He fell only a short distance (most accounts agree that it was less than thirty feet); but he fell headforemost and his neck was broken. Otherwise he bore no disfiguring marks. The body was immediately placed on a train of flat-cars that stood nearby, and was brought to New Orleans. A careful examination of the wrecked plane disclosed that the throttle was closed and that the flying wires were intact.

The statements of the witnesses disclosed:

"First, that Moisant attempted to land when apparently no necessity arose for his landing at that particular moment or at that particular point.

"Second, that when he started to land he was flying with the wind."

Moisant had always maintained that landing with the wind was one of the most dangerous things that a flyer could do. It may be safely assumed, all things considered, that the tail of the machine was tilted by a gust and, with the weight of the extra gas dragging it down, there was no chance for recovery.

Thus ended the career of an adventurer, who, in a little more than a year, wrote his record of achievement in the annals of the air.

A New Department

Popular Aviation is announcing a new section on College Aeronautical Activities that will be started in the August issue. The movement of universities and colleges is toward development of interest, arousing enthusiasm, training men for the field, and the education of a large and important part of the public in the uses and importance of this ever growing field of transportation. The college trained man has, from the very beginning of the industry, influenced in no small measure the progress of aeronautics. This influence has been both direct and indirect in its effect on the aeronautical world. A great majority of the leaders in the field have received their actual training in preparation for their career or have acquired a background on which they added a specialized training for their particular activity.

The indirect influence of the college man, perhaps, is greater than that of the direct, which takes in the actual training for the field. The education of an intelligent group, which will contain leaders in all phases of commercial and social life, as to the importance and the potential uses of aircraft, will result in the introduction of this means of transportation into fields that are beyond our greatest imagination.

College clubs and aeronautical courses of all descriptions have already been started and many have been in existence for quite some time and have achieved marvelous success. The movement extends the length and breadth of the land and it is only a question of time until all the higher institutions of learning will join the others in paving the way to a more comprehensive system of education and training.

This section will be started for the purpose of furnishing a means of outlet for the news of college aeronautical activities, for the promotion of interest, the stimulation of friendly rivalry, and the urging and if possible providing a greater degree of co-operation that, heretofore, was impossible. We are quite interested in keeping in touch with all these activities and we hope that all those that have not written to us will contribute to this section regularly.

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What's Doing at Washington

(*Continued from page 66*)

eral, W. Irving Glover, recently announced that a change in air mail schedule between Chicago, Ill., and Cincinnati, Ohio, has been approved by the Post Office Department. The revised schedule is as follows: Daily-Southbound: Leave Chicago, 6 a. m., C. T.; leave Indianapolis, 7:55 a. m., C. T.; arrive Cincinnati, 10 a. m., E. T.

Northbound: Leave Cincinnati, 5 p. m., E. T.; leave Indianapolis, 5:15 p. m., C. T.; arrive Chicago, 7 p. m., C. T.

Postmasters at Albany, Schnectady, Utica, Syracuse, Buffalo, and Rochester, N. Y., have been issued special cancellation stamps to celebrate the opening of the Albany-Buffalo air mail route on June 1st.

The Senate Committee on Military Affairs inserted an entirely new bill on promotion of Army Air Corps Officers in place of the one they received for consideration, Senator Reed announced recently. The new bill will have a tendency to eliminate the so-called "hump" in the lower grades of the Army caused by the great influx of junior officers in the World War period, which has resulted in practically stopping promotions in the grades of first lieutenant and captain. According to the draft agreed upon by the Senate Committee, promotions will be based upon the length of service. Senator Reed also stated that the need for higher officers in the Air Corps was keenly felt. When the bill came before the House it was passed without a record vote. This eliminates the obstacle that for quite a period of time has been confronting Chiefs of the Army Air Corps.

Postmaster General New has awarded to the Robertson Aircraft Corporation of St. Louis, Mo., the contract for operating the air mail route from St. Louis, via Kansas City, to Omaha, Nebr., and return. The bid of this firm was 78½ cents a pound, the lowest bid received by far. As this is the lowest rate for carrying the mails over any route now in existence, the Postmaster General believes it indicated a growing profit for the mail carrying companies.

The Thompson Aeronautical Corporation of Cleveland, Ohio, was awarded the contract for carrying the mails by air over the route from Chicago, Ill., to Kalamazoo, Mich., via South Bend, Ind., to Bay City, via Lansing, Flint, and Saginaw, with spurs branching out from Kalamazoo to Pontiac, via Battle Creek, Jackson, Ann Arbor, and Detroit, and to Muskegon via, Grand Rapids. The bid for this job was 89 cents a pound and was the lowest received from all competitive companies. The route from St. Louis to Omaha will not be placed in operation for several months as it will require the lighting of the air way for night flying. The route from Chicago to Indiana and Michigan points will commence operation during the early part of the summer or just as soon as the contractor can make arrangements for landing fields and place his equipment in condition for mail carrying.

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Dodo Days

(*Continued from page* 30)

ing the process four or five times, before walking over to the garbage can, fifty feet distant, to dump his heavy load.

This lasted until three o'clock, when we were given a short respite before drill.

Another bell and the shout of "Drill" was heard, and the awkward squad again tumbled out to fall in for drill formation.

"Fall in!"

" 'Tenshun!"

"Right face!"

"Front!"

"Count off!"

"One, two, three, four; one, two, three, four; one, two, three, four, five—"

"As you were! Number one, in third squad, front rank, what's your number?"

"Wake up, dodos! Count off!"

"As you were! Can't you fellows count? Snap out of it! Count off!"

"Right face! As you were! Half you men tried to do right dress! Snap out of it! 'Tenshun!"

"Squads right—March! What's the matter, you, Number One, second squad, front rank! Why didn't you hold that pivot?"

"Column left—March! Don't anticipate the command—wait for the 'March!' "

"Company—Halt!"

"Forward—March!"

"To the Rear—March!"

"Right Oblique—March!"

"Forward—March!"

"To the Rear—March!"

"By the right flank—March!"

"Company—Halt!"

"Stand at—Ease!"

"At Ease"—There ensued a ten-minute interval of instruction on the maneuvers and new commands were explained. After this drill was resumed; and this was the daily practice for the remaining eight months at Brooks for those lucky enough to remain.

"Company—Dismissed!"—and the cadets rushed for the barracks for another few minutes of rest.

Another bell. Fall out, and Fall in for Retreat—that was the order. The usual commands and the proper salutes were made by the entire company. The Officer of the Day came out and read his report. It contained a report of all the formations, etc., and a list of the irregularities and the penalties and one could learn the number of demerits received.

After supper, as we always called it, the general procedure was the well-known "Bull Session," which consisted for the most part of barracks flying—better known to us as "Bunk" flying. In each bay there were always one or two gatherings discussing the problems incident to flying, what they intended to do and how they hoped to do it. Not one of them seemed so very confident.

This schedule, not exactly on the school roster, was to be seriously interrupted at the beginning of ground school, which was about two weeks distant. All the time, up till then, was to be taken up mostly with the numerous examinations and tests—which will be spoken of later.

There was an eight p. m. bed check every evening, and at ten a check was made to see that all the cadets were in bed.

"Ding, ding, ding, can't say anything more tonight—am in bed—will be back for reveille at six a. m."

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Germany in the Air

(*Continued from page 26*)

planes might be regarded as significant, but while Germany is not allowed to maintain any military or naval air forces their commercial fleet at the same time is not as large in the number of planes as those of some of their competitors. In 1926 the total number of planes in Germany engaged in commercial flying was only 120 and their number now while somewhat increased to meet the demands of their many air routes is not large. Britain or France, have large commercial air fleets and likewise large military forces.

While the Treaty of Versailles has been Germany's biggest obstacle to overcome in the development of aviation it might be said that in one sense it has helped them to develop their commercial aviation since they are not allowed to support any military or naval forces and therefore can devote all of their activities towards the perfecting of the commercial services. It has likewise helped them in this way for the German people without a military force to support are taxed but 30 pfennigs (eight and a half cents) per capita a year for the upkeep of the commercial service. English and French people are taxed the equivalent of four and five marks respectively (a dollar and a dollar and a quarter) per capita for the support of military, naval and commercial air fleets.

The German Luft Hansa system is able to maintain their schedules to a remarkable degree of regularity. Last year up to 90% of their air traffic was maintained as scheduled. Rain, snow and winds of considerable velocity do not cause postponements or cancellations in the service. The fog, however, is the planes' greatest enemy and something to be reckoned with in the maintaining of a regular schedule. As is the case of all of the European air lines, there is to be found an excellent meteorological bureau which is informed of the prevailing weather conditions all over Europe. All of the planes are equipped with radio and are therefore able to keep in touch with these bureaux. In 1925 their official statistics show a coefficient of 0.03% of accidents. There was no fatal accident in 1926 although one major accident occurred in 1927. As far as safety is concerned it is regarded as safe as any other means of transportation in Germany.

Germany is perhaps more air-minded than any of her competitor nations. The Reich government is bending every effort to bring this about and have succeeded to a remarkable extent. The fact that Germany is an air-minded nation has been one of the principal factors in building up their air system. German people were willing to contribute to the support of such a project and German people use their planes continuously. From the writer's experience in flying in German commercial planes it appears that the majority of the passengers are business men and frequently the brief case is a part of the personal luggage that is carried. Men whose affairs take them from city to city find the air route an ideal

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The Galt Joint Union High School has aroused national and worldwide interest during the last two years as the first High School known to actually introduce flying and aeronautical work in a public four year High School. During the past year, gifts from the Government and other sources in aeronautical equipment have exceeded the sum of $150,000.00, including the latest and most modern flying planes. Owing to the demand and the large amount of equipment on hand, the Board of Education has established a Junior College course in addition to the High School work, the college work being accredited by the University of California.

The Galt Joint Union High School and Junior College is located in the famous Sacramento Valley only fourteen miles air distance from the famous Government Mather Field. The school has its own flying field adjoining its buildings and is one of the model fields of the valley, having graded runways in all directions and capable of handling any amount of traffic.

ADMISSION

Students are expected to make formal application for admission to the High School and Junior College upon blanks supplied for the purpose. Information is sought by this means not only concerning the scholarship of the students but also concerning their character, attitudes, and probable ability to appreciate and co-operate with the ideals and standards of the College Department and a limited number of those who meet these qualifications will be acceptable.

Students from other approved high schools or colleges are admitted without examination upon presentation of properly authenticated certificates showing in detail the requisite completed courses.

Blanks will be furnished by the secretary of the High School and Junior College, on which the record of the work done will be certified.

ADMISSION UNITS

For admission to the Junior College Department, High School graduation with a total of fifteen (15) recommended units is required. The definition of the word "unit" as accepted by the University of California in its admission of students into that particular institution.

For further information address the Aeronautical Department, Galt Joint Union High School and Junior College, Galt, California.

means of transit and one that saves much valuable time. Differing from the services of other nations, the German line does not apparently depend upon the support of the tourist traffic to any extent but rather has a constant demand for its services from the German people. The German government devotes much effort to creating a taste for flying among her people and starts in the class room with the younger generation who will be tomorrow's flyers. Students are urged to go to air schools and frequently lectures on aviation are given in the class room.

A dirigible, the LZ-127, is now in the course of construction at the Zeppelin works in Frederichshaven and when completed it will be used for passenger and mail service between either Germany and South American cities or the United States. It is expected to be ready for its trials by next August and there is much rivalry between the builders of this airship and those who are building the R-100 in England for a similar service. This dirigible is being built especially for long distances and its radius is expected to be 60,000 kilometres (37,775 miles.) The duration of a flight from Germany to New York is expected to be 60 to 80 hours while a flight to Buenos Aires will take 100 hours. Germany has already obtained the approval of the Spanish government for a line of dirigibles to fly between Seville and Buenos Aires.

The opening of the Barcelona-Madrid line, coinciding with the signing of an Air Convention between Spain and Germany, has reawakened interest in commercial air navigation in Spain. The convention with Germany signed recently regulates the reciprocal treatment which airplanes of either country will receive in entering or flying over the territory of the other, and looks generally to the establishment of air lines between the two countries. It was also agreed later that in conformity with the Convention an air line uniting Madrid and Berlin should be established as soon as a company could be formed to operate it, the company to consist of German and Spanish interests in equal proportion.

behind their air services they are bound to be successful and maintain the high standards which they have built up. Having an air-minded people to support them is perhaps one of the biggest assets they could wish for and it is something that other nations can envy them for having. German technical skill is constantly improving and perfecting their flying stock and has enabled them to keep up with the best in Europe despite the handicap of restrictions placed upon them. The future of German

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Mountains of Skyland

(*Continued from page* 12)

extends to a horizon two hundred miles away. The British Isles could be packed within our circle of vision. Sunshine and fair weather extend over the entire region excepting that covered by the great thunderhead range. We tilt upward and swing ponderously into a nosedive. Downward we go at a speed which also belongs to this fairyland. We glide down the ridge of one of the cloud-ranges until we reach the lower level of clouds which trail in the wake of the majestic storm-center. Beneath us is a brilliant white "arctic sea." Here are "pressure ridges"; there are windswept "snow-fields." To those on earth far below us, it is a dull overcast sky from which a drizzling rain is falling as an anti-climax of the noisy, lashing thunderstorm. The smudge of earth is below that pure white blanket. We are in the clean air of upper cloudland canopied by the blue sky which is fretted here and there with wisps of clouds of snow-crystals miles above. Our shadow upon the brilliant white sea of clouds below is the only visible moving thing. Even it is not earthly, for it is fringed with delicate tints of the colors of the rainbow. This is a characteristic of shadows cast upon clouds and it seems a perfect adornment of shadows in this fairyland.

We dislike the thought of forsaking this region of clouds, with its unrealities and thrills and wonders, for the commonplace earth below that haze. We near the edge of this "polar sea" and wander among the isolated sculptures of skyland. Their crests strain forward in the wind as if urging onward their lagging bodies. Some of the vaporous mountains are disintegrating. We pass in and out among these fairy crags, reluctant to leave. The earth is sunlit over there, but behind us it is lost in shadow and rain. We soar through the disintegrating mountains, careless of collisions with the fairy things. We pass among the great fragments, alternately in sunshine and in shadow. Passing out of them, we glide for a mile or two through ghostly scuds, finally to land in brilliant sunshine and where the sky has been unclouded all day long, for our thunderhead was twenty miles away. With this experience added to many others in skyland, we possess renewed assurance that living is not measured by years, but by the intensity of hours which is the result of flying with an open consciousness, seeing eyes, and some knowledge of the things encountered on skyland trails.

In an hour or two we have witnessed many wonders of the realm of clouds. We have glimpsed behind the scenes of one of Nature's mightiest spectacles. We have visited polar regions and have seen spread below us the filigreed coast-lines of two states. We have enjoyed a range of vision possible in only a relatively few places on earth.

We sit down and contemplate the region from which we have come. Many broken clouds at various levels are scattered over that portion of the sky. Different currents of air carry them in various directions. It is as if Nature is now uncertain of purpose; but to us who have seen this thunderstorm from the high point of vantage above it and were intimate with it, it is plain that Nature is clearing the stage after a great spectacle. Perhaps soon the great cloud range will be broken up completely, and the fragments of clouds may evaporate in the thirsty cold air which has come from the heights to replace the great displacement of warm air taken upward in the boiling crests of the thunderheads.

It is late afternoon. If these great masses of clouds remain a while longer and if the hundreds of fragments of clouds at different levels do not disappear into the thirsty air or are not driven too far away, a gorgeous sunset is in prospect. It requires clouds, many of them at different levels to give us the wonderful colorful sunsets. These, too, are worth seeing above as well as below. If that great range of cloud-mountains should linger intact, perhaps we might have a thunderstorm this evening. Although much of the beauty of the clouds is missed in night-flying, darkness adds much to the mystery, awesomeness, and majesty of a thunderstorm when viewed from an airplane. The play of lightning from cloud to cloud, the revelation of clouds in the brilliance of the momentary flashes, and the awesomeness of the entire setting canopied by the starry sky overhead is worth much to witness. But we have had sufficient to think and to dream over—enough to live over with many thrills for one day. But there are still countless wonders in skyland. Besides its majesties cloud-mountains, the sunsets, and night-flights, there are the winds, many cloud-forms, cloud-levels, weather, high altitudes, extensive ranges of vision, the annihilation of distance, the phenomena of meteorology, and countless cloud-capers. Then there are the stars, the aurora borealis, and imaginary flights far above those which we can achieve by airplane.

All these are phases of skyland in which interesting knowledge adds something to the fascinating beauties and the thrilling wonders of a realm

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new to most persons. Flying has almost infinitely more in store than a mere means of getting from one place to another. With a consciousness open to it, new scenery always greets the aerial traveler over the same route. We must travel new trails on earth if we desire new scenery, but not so in the aerial world. The scenery of skyland is ever-changing, from both aerial and earthly viewpoints. That is why it is fairyland.

Book Review

A B C of Flight, by W. Laurence LePage (Wiley, $1.50.) Books on fundamentals have a habit of wandering a little too far afield in the author's eagerness to bring his reader to an advanced stage. Mr. LePage's contact with students when he was on the aeronautics staff of the Massachusetts Institute of Technology has kept him from making this mistake. His book, which is a revision of a series that appeared in a well known newspaper, keeps to the level of the layman throughout. When it is considered that the average reader of a book finishes it in a surprisingly short time, the wisdom of such a course is apparent.

Mr. LePage, who is now associated with Pitcairn Aviation, Inc., of Philadelphia, manufacturers and operators of aircraft, developed an early interest in flying. He was a model "fan" when only fifteen years of age, and has been attached to the industry since his eighteenth year. With his background of experience in research, teaching and writing, all on aviation subjects, it is not a matter of surprise that such a readable and instructive book has been produced.

The explanations of the natural laws that are made use of in flight, and the clarity of the diagrams with which he illustrates the points, are such that few passages have to be re-read in order to understand flight in theory and practice.

After all, as the author points out, flight is not magic, and the airplane is not an exception to natural laws. It utilizes certain natural forces and the understanding of these, together with the results of their application, is not a difficult matter but one that any intelligent person may master.

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What Shall I Read?

THE subject of home study is one to be taken seriously. Although a man cannot gain a pilot's or mechanic's license without practical experience much valuable knowledge can be gained by intensive and systematic text book work. A man without the fundamentals of aviation is seriously handicapped for the first few weeks after entering an aviation school. If, however, he has these fundamentals firmly fixed in his mind, his more rapid progress repays him for the time spent in home study.

On entering this field a certain definite type of work should be chosen. General men are employed, it is true, but the aviation industry is like all others, tending to become more and more specialized, and the specialized man will be most in demand.

To generalize, the field may be divided into several groups. There is the mechanic, whether a service man or a factory man; the technical man, either engineer, designer or draughtsman; the flying group, which will be dealt with at greater length; and finally, the layman interested in aviation, who wishes information, whether for reasons of business or pleasure, but does not care to enter the field for a livelihood.

All study may be divided into three periods; Elementary, Applied or Practical and Advanced. In the case of aviation the elementary period includes the same reference books for each division of the field. The budding pilot, prospective mechanic or fledgling engineer will each have to cover the same amount of ground. They will read with a different ambition and goal in view but the text material is the same. They must know what it is all about, why and how an airplane flies, the scope and limitations of aircraft, and the basic principles of construction and operation. After this period their interests diverge, but this period remains the "grammer school" of aviation.

The Elementary Course

The A. B. C. of Aviation, *Barber*	$3.50
Everybody's Aviation Guide, *Page*	2.00
Modern Flight, *Clevenger*	1.00
The Aeroplane Speaks, *Barber*	3.75
The Book of the Aeroplane, *Pritchard*	3.00

The Mechanic

A mechanic's work naturally divides itself into sections. Engine work constitutes only a portion of his duties. He must know how to rig a ship, and something more than an elementary knowledge of design and construction is needed if he is ever to become a top-notcher in his chosen field. After covering the common elementary books in order to gain a knowledge of the field in general, he should set out to cover the three periods of his own chosen work—the elementary, the practical and the advanced. It is suggested that he select his texts for study from the three following groups of books, three from the first two lists and four from the third.

First Period

Aviation Engines, *Page*	$1.25
Aviation Engines Trouble Chart, *Page*	.30
Modern Aircraft (engine section), *Page*	5.00
Engine Encyclopedia, *Angle*	7.50

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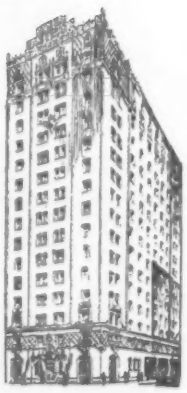

Second Period

Aeroplane Construction, Operation, and Maintenance, *Rathbun*	$2.50
Modern Aircraft (types of planes, construction, operation)	5.00
Aeroplane Design and Construction, *Pomilio*	5.00
Mechanics of the Aeroplane, *Duchene*	3.50

Third Period

Elementary Principles of Aeroplane Design, *Judge*	$2.25
The Airplane Engine, *Marks*	6.00
Automobile and Aircraft Engines, *Judge*	8.50
Aircraft Power Plants, *Jones*	4.25
Aeronautical Science, *Hart and Laidlet*	2.50
Aviation Engines, *Dykes*	5.00
Modern Aircraft (design of aircraft engines), *Page*	5.00

The Engineer

The aeronautical engineer, or designer, is in a group more or less remote from the more practical professions or callings of pilot and mechanic. A great deal of application along scientific lines is called for and a knowledge of higher mathematics is a necessity, for much of the work and study involves problems and formulae of an advanced kind. It is assumed that the student is capable of following the texts suggested, so no strictly mathematical books have been included. As before, there are three periods of study, and it is suggested that three books be chosen from the first two groups and four from the last.

First Period

Elementary Aeroplane Design, *Judge*	$ 2.25
Elementary Aeronautical Science, *Hart and Laidlet*	2.50
Modern Aircrat (design and construction), *Page*	5.00
Aircraft Handbook, *Colvin and Colvin*	4.00
Airplane Design and Construction, *Pomilio*	5.00
Text Book on Aeronautics, *Shaw*	5.00

Second Period

Airship Design, *Burgess*	$ 9.00
Force of the Wind, *Chatley*	1.50
Aeronautics in Theory and Practice, *Cowley and Levey*	10.00
Design of Screw Propellers for Aircraft, *Watts*	8.50

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Aerofoil and Airscrew Theory, *Glauert*	5.60
Aircraft and Automobile Materials (Ferrous and Non-ferrous), *Judge*	ea. 8.50

Third Period

Dynamics of the Aeroplane, *Williams*	2.50
Aeroplane Structural Design, *Jones and Frier*	6.00
Aeroplane Structures, *Pippard and Pritchard*	7.50
Airplane Design (aerodynamics), *Warner*	7.50
Aeronautics, *Wilson*	4.00
Aerostatics, *Warner*	3.25
Applied Aerodynamics, *Bairstow*	12.00
Fluid Velocity and Pressure, *Pannell*	4.00

The Flying Group

This group includes both the general and the specialized pilot, the navigator, meteorologist, surveyor and photographer, radio operator, and many others. Among the unclassified members of this group may be mentioned any one who flies a ship for purposes of business or sport. The salesman or business man seeking economy and speed in transportation, the farmer who sees in the plane another implement or machine particularly adapted to his requirements, the country dweller who works in the city and sees the plane as an efficient tax for his use—all these and many others come under the flying group. They are either present or future operators of aircraft. As such, their requirements are quite similar. More than an elementary knowledge is necessary. It would be impossible to subdivide the group so as to take in every possible user, but in the following groups various texts will be suggested for the use of those coming under this classification.

To attempt to submit a full list of the classes which the last group covers would be an impossibility, for the arm of aircraft is long reaching and is making itself felt in a myriad of different ways.

The farming group is one which is realizing the importance of airplanes in connection with its combat on insect or parasite vegetation destroyers. It has been shown that a plane can spray hundreds or thousands of acres in a space of time which makes this sort of work very profitable. On the immense farms or ranches in the southwest, air transportation is surpassing the automobile because of the saving of time, which, in some instances, cannot be estimated in dollars and cents. Although the comparison will not be exactly similar, the example can be given of the farmers buying automobiles in place of the old time horse and buggy. When a faster means of transportation presents itself, the farmer or rancher is one of the first to take advantage of it.

More than an elementary knowledge is necessary, for, if anyone in the above group purchases a plane, he sooner or later must expect to be his own pilot.

The Pilot

The pilot is not a highly specialized worker, such as the designer. At the present time the pilot must, of necessity be a practical "all-around" mechanic as well as flyer. Under many conditions he must make his own repairs and inspections, and the burden of maintenance falls on his shoulders. To obtain his license he must show his ability to fly, to navigate, to make simple weather forecasts, and know the requirements of the Department of

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Commerce in relation to aircraft. At present he occupies much the same important position as the master of a ship.

His study can also de divided into three periods, starting with elementary work, and progressing through construction, navigation and meteorology to advanced flying and other specialized pursuits.

First Period

Airmen's International Dictionary, *Dander* $2.50
Dictionary of Aviation, *Pierce* 3.90
Learning to Fly in the Army, *Fales* 1.50
Modern Aircraft (Operation), *Page* 5.00
Flight Without Formula, *Duchene* 3.50

Second Period

Aeronautical Meteorology, *Gregg* $2.50
Aerial Navigation (notes and examples), *Card* 3.75
Book of the Sky, *Luckeish* 3.50
A Cloud Atlas, *McAdie* 1.50

Third Period

Aviator's Flight Log Book and Commerce Regulations $1.50
Modern Aircraft (construction, maintenance, repair), *Page* .. 5.00
Aircraft Engines, *Dykes* 5.00
Aerobatics, *Barber* 3.50
Aircraft Instruments, *Eaton* 5.00

The Navigator and Meteorologist

The navigator and meteorologist is a newcomer, comparatively speaking, in the aircraft field. Our army and navy air corps have trained experts in these fields, but little attention was called to these professions until the ill-fated Dole races of last year. The navigator detailed by the navy to assist the pilots entered in the race to Hawaii was assailed with much criticism for his insistence on at least a rudimentary knowledge of navigation—or avigation, as some insist it should be called when applied to aircraft. Results showed the wisdom of his requirements.

Meteorology, which relates to weather, is practically inseparable from navigation, although strictly they are two different sciences. In the operation of aircraft, however, the two interlock in such a manner that for practical purposes one man should understand both. This, of course, does not actually apply to the meterologist on ground duty, but we are discussing here only the flying group.

Few books have been written especially for this particular branch of aviation, but as more attention is being paid to this study than formerly, there will soon be available a comprehensive list of works covering the various phases of this work.

1. Aerial Navigation, *Cards* $3.75
2. Aerial Navigation and Meteorology, *Yancey* 2.50
3. Aeronautical Meteorology, *Gregg* 2.50
4. A Cloud Atlas, *McAdie* 1.50
5. Man and Weather, *McAdie* 2.00
6. The Force of the Wind, *Chatley* 1.50
7. Book of the Sky, *Luckeish* 3.50
8. Aircraft Instruments, *Eaton* 5.00
9. Modern Aircraft (Navigating Section), *Page* 5.00

The Photographer and Surveyor

This is a work which attracts the adventurous, for in no other business is there such an opportunity for seeing new things, gaining new viewpoints, and making explorations.

(*Continued on page* 93)

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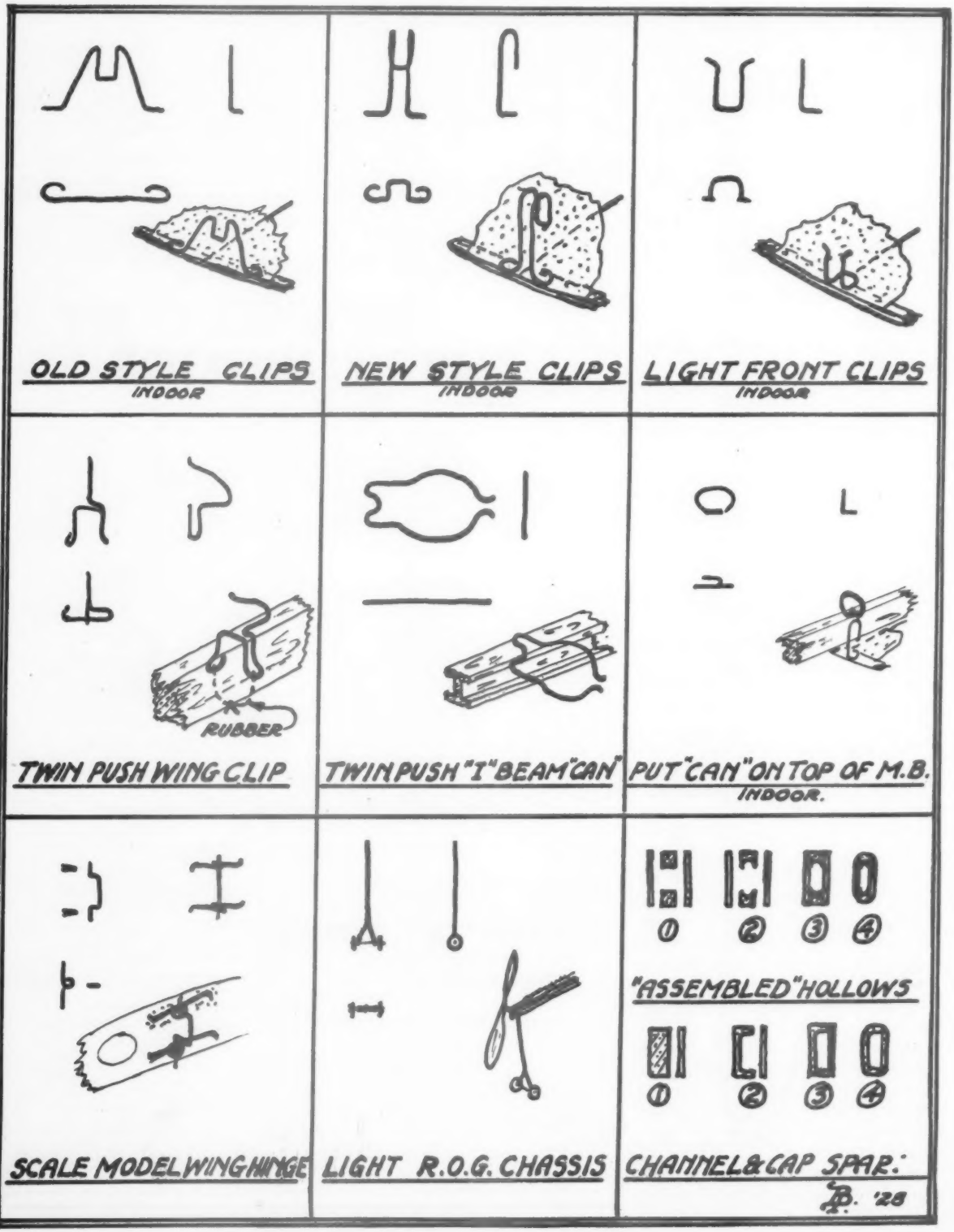
Model Builders' Department

(Continued from page 62)



(*Continued from page 62*)
and repeat raising the nose to a level position before launching.

Point No. 6

Keep cool! Have your model built and tried ahead of time, with a few extra parts, propellers, a wing, frame, elevator, and motors. In other words, have enough parts for a spare machine and know ahead of time of the contest where to set the wings and how many winds to use. Take your time and make each flight better than the first. Use the most winds in your last flight.

Construction Features and Handy Kinks

To keep your Ambroid cement in good condition, use from a small can keeping a cover over the can when not in use. Fill the small can from a large one.

For record models, use soft light weight balsa and dope the outside with several coats or more till the surface becomes smooth. Sand lightly between coats to make the gloss come out. This hard skin on the extra light balsa makes a strong yet light construction.

Allow one coat of Ambroid to dry wherever bearings, motor hooks, propeller shafts, etc., are to be attached to prevent crushing of the balsa underneath the fittings. Use several coats of Ambroid over fittings to hold them securely.

Bend bamboo over a hot rod or tube if you have trouble with bending in a candle or spirit flame.

Round bamboo splints can be uniformly and quickly made up pulling split strips through several holes in a ⅛ in. steel plate, each hole being smaller than the previous one. When started through the holes, pull the strip through with a pliers in one steady pull.

See the drawing for further model details and helps.

Why the Longer Tail

The Spirit of St. Louis, as printed last month, had a slightly longer and larger tail than true scale but this is necessary for a good flying model since there is no pilot in our model to guide it on its course. The tail on the big Spirit was designed for speeds of 85 to 120 miles per hour while the model flies between twelve and eighteen miles per hour, which is another reason for making the tail larger.

A Winder Without a Winder!

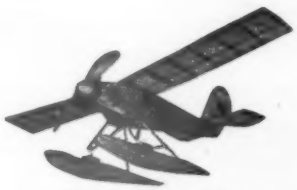
• To the South Bend boys at the Y. M. C. A., credit is given for the following helpful kink:

We all know, or should know, winding rubber by hand cuts the edges of the motors and they break much sooner than when wound by stretching them and winding with a winder. Of course, winding too much with a winder kills the pep; but, remember, considerably more winds can be put into stretched motors without this loss of "pep."

Here is the handy stunt the South Bend boys used and simple as it seems, it is a new idea and is quite handy. Hook the "S" hook to a nail, thumb tack, wire or whatever is handy. Stretch the motor three to four times normal

The SILVER ACE
FLYING MODEL

Wing Spread 30 in.—Weight 3¾ oz.



Pontoons $4 a pair

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Buy a SILVER ACE or build one in a day from a partly assembled set and enjoy the new National Sport of flying this beautiful model on land or water. At the Aircraft Shows in Detroit, Syracuse, and Minneapolis thousands learned from the SILVER ACE exhibits what this scientific model is creating in the junior study of aviation. The Monoplane flies 800 feet. Add an extra pair of wings and you have an equally well flying Biplane. Add SILVER ACE Pontoons and its flight will surprise you.

Study the bird-like automatic dihedral of the wings in midair! Learn of an inherent stability that permits launching in flight with the wings in perpendicular position! Note the thrust of a semi-flexible propeller, and the wing loading possible even with pontoons. You will find the detachable, hollow, silk covered wings add long life to your ship, and the patented demountable motor stick greater power.

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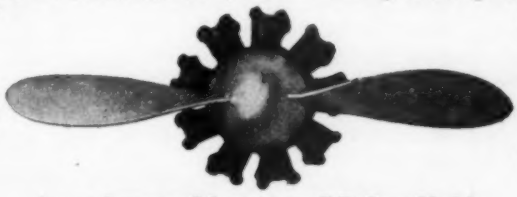

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A new dummy radial motor on all De Luxe Models.

And a new Contest Kit, to be built entirely from the ground up. All materials, and drawings by SILVER ACE engineers—$5.00.

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This IDEAL New York - Paris Monoplane is a perfect copy, 3-ft. size of the machine in which Lindbergh crossed the Atlantic Ocean. Any bright boy can build this model: The IDEAL Construction Outfit contains everything needed: all parts, fittings, materials and supplies, including careful instructions, plans and diagrams. The model is wonderful; has many features of the original and is guaranteed to fly. Complete Construction Outfit..... **$7.50**

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length in the usual way and wind the propeller by hand. "Walk in" or shorten the motor as you wind. When wound up, simply unhook the "S" hook from its temporary fastening and slip it into the hook on the model. You have the extra winds in your motor. The motor is not frayed or cut on the corners. And, best of all, you get almost as good duration as though you had used a winder!

The motors will not lose much pep with extra winds if you keep them well rubbed with tire talc or graphite or a mixture of the two. This prevents sticking together which causes the loss of pep. Oil and perspiration from the hands spoil rubber quickly so don't handle rubber more than is necessary. Use a new motor occasionally as it will pay in the way of added power, pep and duration.

Book Reviews

Building and Flying Model Aircraft, by Paul Garber, (Ronald, $2.25) is the latest addition to the Ronald Aeronautical Library, which already includes works covering nearly every phase of this subject. Boys have been handicapped in the past by not having a standard work on which to base their experiments in model building. The importance of the sport—if you wish to call it one—need not be emphasized here. Such men as Orville Wright, Lindbergh, Secretaries Warner, Davison and MacCracken testify in the introduction of this book to the far-reaching results of model building.

Ideas for design, some of them of great value to the industry, have been developed in model flying. There is the building up of an airwise generation to be considered, as Orville Wright says "by helping you to understand and appreciate what is to become an important feature of our lives."

Mr. Garber has collected material for this book from a number of different sources, and the result is a manual of value not only to the beginner, but also to the student of elementary aeronautics and the manual training instructor or playground director. The reader is taken through the various steps in construction and theory, and a real

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1/16" x 1/8" x 3'		.045	.054
1/16" x 1/4" x 3'		.030	.045
1/16" x 1/2" x 3'		.048	.054
1/8" x 1/8" x 3'		.054	.06
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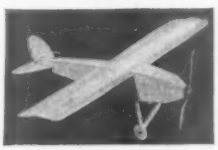

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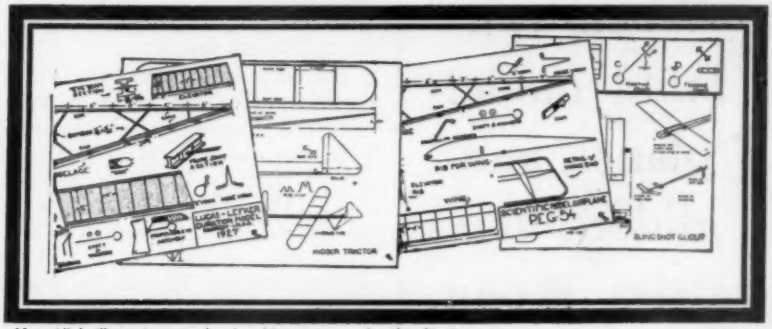

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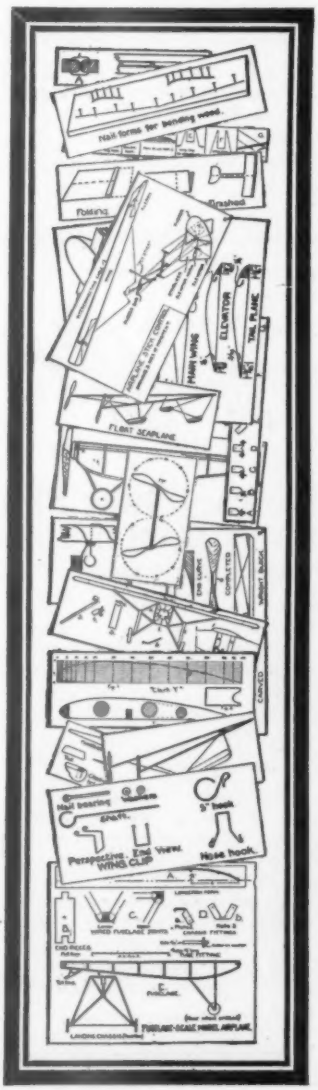

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Model Aircraft are no longer merely toys. They have a definite and increasingly important place in the study of practical aeronautical engineering and design. Thousands of men and boys throughout the country are building and flying models; their number is growing with amazing rapidity. New records are constantly being set; flights of more than a mile and lasting ten minutes or longer are by no means uncommon.

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What Shall I Read?

(*Continued from page 87*)

Aerial surveyors cover thousands of square miles of land on which men rarely set foot, and the coming popularity aerial survey from a business standpoint, will send these airmen into many strange parts of the world. Books on the subject, however, are few and far between, as this is a rather specialized type of flying.

For a start the camera should be studied, and the various phases of picture taking, developing and photochemistry should be covered. Special planes are sometimes used; equipment and operations vary from those used in other branches of aviation. Still, once an aerial photographer becomes interested in his work, it is hard to find a more contented man.

First Period

1. Lens Work for Amateurs, *Orford* $1.00
2. A Manual of Photographic Technique, *Hibbert* ..... .85
3. Photographic Chemical and Chemistry, *Bentley* 1.50
4. Commercial Photography, *Charles* 2.00

Second Period

1. Airplane Photographs, *Ives* $4.00
2. Aerial Photographs, *Reeves* 5.00

The former fully describes the camera with its operation and maintenance, the films used, developing, enlarging and sighting while in the air, together with illustrations of map making, oblique aerial photography, and interpretation of aerial photographs. It also explains the technical and pictorial uses, with articles on exploration and mapping. The latter is closely connected to army photographic work, but is equally as valuable either to the experienced man or the beginner. It explains how to employ aerial photographs in scouting and patrolling, infantry attack, traffic and communication maintenance, air operations, field engineering, supply and construction. It illustrates the method of recognizing ground features on an aerial photograph, how to determine the scale and plot photographs on a map, with illustrations of photographs in conjunction with maps, and how to obtain terrain information when maps are lacking. Both books are worthy of close study and will certainly afford an almost unlimited amount of help as home study texts.

The Radio Operator

If we may take foreign experience as any indication of the trend of affairs in aviation, it will not be long before one of the crew of every large passenger airplane will have to be a radio operator. Continental pilots, on many of the foreign lines, are constantly in touch with their home ports, and receive course directions, weather reports and other information while in flight. They also transmit, while flying, weather information to the home port for the guidance of other pilots. The following books are study manuals, which, combined with practical experience, should greatly increase a man's effectiveness in this work.

1. Introduction to Wireless, *Fleming* $1.00
2. Elementary Telegraphy, *Pendry* 2.25
3. Wireless Telegraphy, *Marchant* 2.25
4. Telegraphy, *Herbert* 5.00

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(The last book is intended for advanced students, while the others are written for elementary study.)

Before covering the last few groups a parting word of advice to the others is necessary. Remember that, unless practical experience is gained, home study will not secure a position. Good schools of instruction are scattered throughout the country and a well planned course, coupled with home study, will bring reward.

The last group, and, unquestionably, the most interesting one, is the layman class. The layman, as a general rule, is not interested in mathematical principles and formulae. His desires are for the type of book bringing him knowledge and yet presenting the facts in an interesting form. It is believed that a series of books on history, travel, famous flights, coupled with elementary work on the operation, construction, and maintenance of aircraft, quicken his interest and make him anxious to know more about aviation. Any of the books named above, excluding the engineering books, will interest him, and to save time and space, we shall list only the more popular ones.

1. Modern Aircraft, *Page*.....$5.00
2. Modern Flight, *Clevenger* 1.00
3. Learning to Fly in the Army, *Fales*..... 1.50
4. Glossary of Aviation Terms, *Page*..... .50
5. Airmen's International Dictionary, *Dander*..... 2.50
6. Dictionary of Aviation, *Pierce* 3.90
7. Everybody's Aviation Guide, *Page*..... 2.00

(Out of the above any three can be picked.)

8. A. B. C. of Aviation, *Page* 1.25
9. The Aeroplane Speaks, *Barber* 3.50
10. Book of the Sky, *Luckeish* 3.50
11. Airmen and Aircraft, *Arnold* 3.50
12. Aircraft in Commerce and War, *Spaight*..... 2.25
13. Aviation in Peace and War, *Skykes* 3.50

The layman is possibly the most important factor outside every great industry. Upon his shoulders rests the future progress of aviation, for his support is a vital necessity. Some are wary of all aviation activities, others have a faint curiosity to know what this rapidly growing industry is all about, while still others are rabid enthusiasts. To interest the two former has its problems, which confront heads of aviation enterprises throughout the country. It is being done through posters, aviation publications and books. Each serves its purpose, but one is more likely to succumb to the thrills portrayed in a well written book or magazine article than to any other scheme. The posters catch his eye for an instant, and then he is lost in the swirl of other activities. The book or magazine article must be well written and interesting, however, for nothing is more disastrous to a man's interest than to have him start off with a book of advanced aerodynamics. It fatigues his brain, and he tosses the subject aside as one which might have its possibilities but is too difficult to understand.

Any of the books listed under the layman's classification are certain to interest him, and create a hunger for more material. To promote true loyalty to aviation, a book on famous flights is invaluable, for he has presented to him the dangers and hazards which confronted the pioneer, and his sense of "hero worship" responds, and he is soon interested enough to fly his mail, take rides in planes, join aero clubs and boost the field in general.

History, Travel, Biographies, Etc.

1. Record Flights, *C. Chamberlin* $2.50
2. Lindbergh—The Lone Eagle, *Fife*..... 1.00
3. Charles Lindbergh—His Life and Achievements..... 2.00
4. "We," *Charles Lindbergh* 2.50
5. European Skyways, *Thomas* 5.00
6. Around the World in 28 Days, *Wells*..... 3.50
7. Conquering the Air,
8. The First World Flight, *Thomas* 5.00
9. Heroes of the Air, *Fraser* 2.00
10. High Adventure, *Hall*..... 2.00
11. India by Air, *Hoare*..... 2.50
12. The La Fayette Flying Corps, *Hall*..... 15.00
13. The Marvels of Aviation, *Turner* 2.50
14. Air Service A. E. F., *Toulmin* 6.00
15. Winged Defense, *Mitchell* 2.50
16. Civil Aviation (joint report) 2.50
17. Commercial Air Transport, *Edwards & Tymms* 2.50
18. Transport Aviation, *Black* 3.00
19. The World's Wings, *Davis* 2.50
20. Aircraft Year Book..... 5.25

Intercollegiate Air Race

MR. GROVER LOENING, the President of the Loening Aeronautical Corporation and designer of the plane which bears his name, has done a great deal to stimulate interest and to arouse friendly competition among the various college clubs. He has donated a Trophy to be competed for annually by College Clubs of the United States. The contest will take place at Mitchel Field, New York, (June 16th) and the Trophy will be competed for each year. Mr. Loening has agreed to donate a trophy for next year.

Having been a former student at Columbia University and the founder of an Aero Club there, Mr. Loening can be considered one of the foremost pioneers in the field of aeronautical activities. He is keenly interested in the welfare of College Aero Clubs throughout the country and is awake to their immense possibilities.

The Trophy will be awarded to the College Flying Club represented by the winning pilot or team, and in addition to the Loening Trophy, Mr. Loening has offered cash prizes and medals to encourage the development of College Flying Clubs as follows: 1st Prize—$500.00, 2nd Prize—$300.00, 3rd Prize—$200.00; while in addition $1,000.00 will be equally divided as an expense bonus for those contestants who qualify.

The Race is to be held under the auspices of the National Aeronautic Association and shall be directly supervised by the Contest Committee of that organization at the head of which is Carl F. Schory the Secretary. The Committee has been fortunate in securing the services of

Colonel Lindbergh, Henry P. Davidson, and Thomas Hitchcock, Jr., to act as judges.

Interest is running high at those Colleges who have already had Clubs which have developed trained flyers, while other clubs have been forming since the announcement of the Prizes and, although many of them will not be prepared for this year's race, they will be all set for the next year.

Regulations

I. The 1928 contest will be open to graduate and undergraduate students holding a Department of Commerce Private license in addition to a sporting license.

II. (a) Entry is limited to stock planes seating one or more passengers, and licensed by the Department of Commerce. Engines are limited to the standard OX5 type without modification of valve gear or change in compression ratio. Propeller ground R.P.M. shall not be more than 1,450.

(b) Amendment:

Stock planes, JN type excepted, powered with OXX type engines may compete provided additional weight is carried to insure the same power loading as for the OX type.

III. Contest Load:

(a) Planes, as loaded, for the race, with crew, fuel, and ballast, if necessary, must weigh not less than 1,800 pounds.

(b) Planes powered with OXX type engines, as loaded for the race, must weigh not less than 2,000 pounds.

IV. Start:

(a) Planes will cross the starting line in flight at an altitude not greater than 100 feet. Level flight must be maintained for one-half mile before crossing the starting line. Diving starts are prohibited.

(b) Contestants will be given the starting signal in groups not to exceed eight planes each.

(c) Planes entered for the first heat must cross the starting line within the intervals 2:00-2:05 P. M., second heat, 3:00-3:05; third heat, 4:00-4:05. Planes starting after the expiration of the allotted interval will receive a time penalty.

(d) It shall be the pilots' responsibility to synchronize their watches with the chronometer used by the Official Timer.

(e) The pilots assigned to the respective heats are alone responsible for their appearance on the starting line at the designated time. No time credits will be given where the pilot has a delayed start.

(f) The referee may declare a postponement of the start on account of inclement weather or for other sufficient reason.

V. Winner:

The winner of each heat shall be the plane which crosses the finish line at an altitude greater than one mile in the shortest elapsed time, etc.

VI. Method of Scoring:

(a) The race will be run in three heats. Each college flying club will assign a member of its team to pilot the club entry—no pilot may compete in more than one heat. He may, however, ride as a passenger if the plane is not fitted with dual control.

(b) Points will be awarded as follows:

First Heat

Winner	8 Points
Second	7 Points
Third	6 Points
Fourth	5 Points
Fifth	4 Points
Sixth	3 Points
Seventh	2 Points
Eighth	1 Point

Second Heat

Winner	9 Points
Second	8 Points

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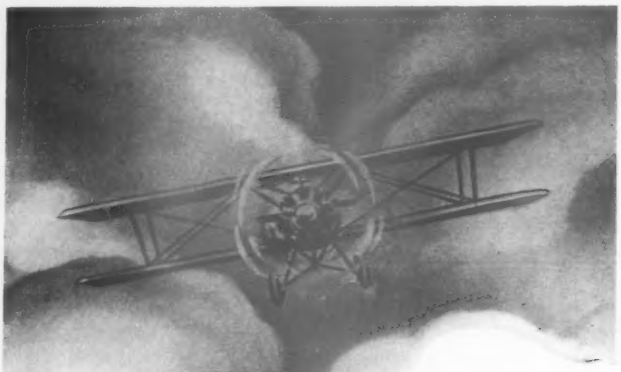

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Third	7 Points
Fourth	6 Points
Fifth	5 Points
Sixth	4 Points
Seventh	3 Points
Eighth	2 Points

Third Heat

Winner	10 Points
Second	9 Points
Third	8 Points
Fourth	7 Points
Fifth	6 Points
Sixth	5 Points
Seventh	4 Points
Eighth	3 Points

VII. Rules of the Race:

(a) The starting line will be designated by the Contest Committee at least one hour before the starting time.

(b) Pilots must taxi and fly on the same predetermined course and in accordance with the referee's instructions.

(c) After the take-off the pilots will maintain a straight-away climb for a distance for a mile or more (minimum distance to be designated by the referee) after which a left turn will be made to approach the finish line.

(d) The finish line will be at an altitude of one mile and directly above the starting line.

(e) Planes failing to reach the specified altitude at the finish line will receive no point credits. The pilot may, however, make a complete left turn and again approach the finish line at the required altitude provided this maneuver does not interfere with other planes.

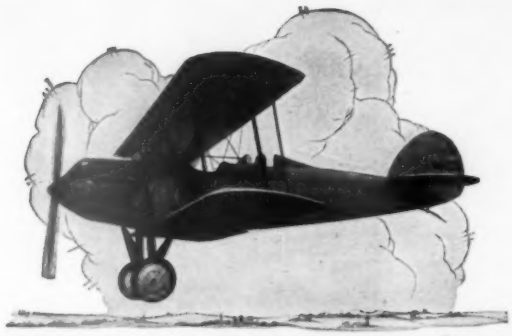
VIII. Disqualifications:

Any contestant breaking the rules of the race, referee's instructions, or any subsequent decisions as to the interpretations of the regulations which may be sent out in writing or posted at the Contest Committee Headquarters at the field, shall, upon the recommendation of the Referee of the Judges, be disqualified.

IX. Protests:

(a) No protest shall be considered unless presented in writing to the Contest Committee within 24 hours after the finish.

(b) The Contest Committee will measure the engine displacement of the three winning planes after the race, and at its discretion check technical details.



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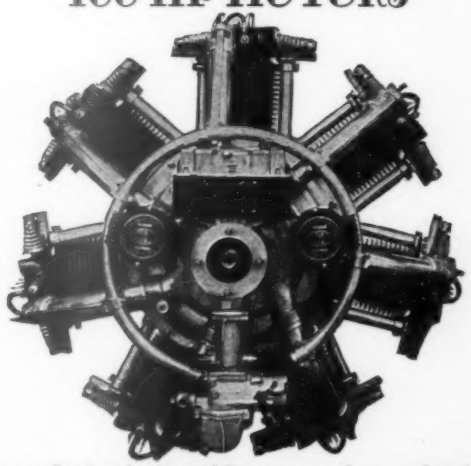

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10 REASONS

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2. Proven Performance.
3. Built to Perform in High Altitudes.
4. Reliability of Company.
5. Largest Sales Force (Assuring Service).
6. Best Materials Obtainable.
7. Best Visibility.
8. Best for Training.
9. Slow Landing Speed.
10. Lowest Price—Value Considered.

Performance Plus!

The Eaglerock has always had performance. NOW it has PERFORMANCE PLUS.

Take the motor of your choice—water or air cooled, 90 to 260 horse power—have it installed in an Eaglerock and you will be proud of it.

Price **$2250** on Field

Less Motor and Propeller

THE EAGLEROCK CAN BE FURNISHED WITH THE FOLLOWING MOTORS:

Ryan Siemens, 120 h. p.
Whirlwind, 220 h. p.
Menasco, 260 h. p.
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Dayton Bear, 120 h. p.
Floco, 150 h. p.
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Rebuilt OX5, 90 h. p.
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Eaglerocks are now being built and tested at their new home, high and dry beneath the shadow of Pikes Peak, Colorado Springs. Construction in a dry atmosphere assures well seasoned materials and eliminates many manufacturing difficulties. Altitude testing guarantees altitude performance.

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ALEXANDER EAGLEROCK

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Minn.—Minnesota Aircraft Co., 406 6th Ave., Minneapolis.
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S. Dak. and N. Dak.—Rapid Air Lines, Inc., 1st Nat'l Bank Bldg., Rapid City.
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TO the operator with limited resources—to the small field where traffic is light—the Viking opens up a tremendous source of revenue that is beyond the reach of the larger, costlier planes. A roomy cabin seating four in comfort and carrying their baggage as well—light in weight—economical in operation—the Viking steps into a field distinctly its own.

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VIKING AIRCRAFT COMPANY
737 South Clark Street, Chicago

SPECIFICATIONS

Span	36 ft.
Chord	6 ft. 6 in.
Wing Area	234 sq. ft.
Height	8 ft.
Length	26 ft. 1 in.
Wheel Tread	7 ft.

DATA

Weight empty	1100 lbs.
Useful load	1000 lbs.
Total weight loaded	2100 lbs.
Fuel capacity	50 gal.
Accommodations	3 passengers and pilot

PERFORMANCE

High speed	105 M. P. H.
Cruising speed	95 M. P. H.
Stalling speed	37 M. P. H.
Gas consumption	10 gal. per hr. full throttle
Oil consumption	1½ qts. per hr.
Wing loading per sq. ft.	9 lbs.
Power loading, 120 Anzani.	17.5 lbs. per H. P.

VIKING